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~~Monet~~ MONETARY RETURNS TO NON-UNIVERSITY HEALTH PERSONNEL TRAINING IN SASKATCHEWAN

University — Université

University of Alberta

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

Ph D.

Year this degree conferred — Année d'obtention de ce grade

1979

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MONETARY RETURNS TO NON-UNIVERSITY HEALTH PERSONNEL TRAINING IN SASKATCHEWAN

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL ADMINISTRATION

EDMONTON, ALBERTA

FALL, 1979

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled MONETARY RETURNS TO NON-UNIVERSITY HEALTH PERSONNEL TRAINING IN SASKATCHEWAN submitted by DONALD JOSEPH PHILIPPON in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Educational Administration.

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ABSTRACT

The major objective of this study was to examine the monetary returns on investment in 12 non-university health personnel training programs in the Province of Saskatchewan. The theory of human capital provided the analytical framework for the study. Accordingly, the central focus of the study was on the relationship between the monetary costs and monetary benefits of training. Costs and benefits were estimated from both the perspective of the individual (private) and the perspective of society (social). The analysis was conducted using cost and earnings data for 1974, 1975 and 1976.

Five cost components were considered in the analysis: (1) educational institution costs, (2) foregone earnings of student, (3) government subsidies to students, (4) student educational costs, and (5) imputed costs of interest on the physical plant and of property tax exemptions. All five cost components were used in the estimation of social costs. Private costs consisted of foregone earnings and student educational costs.

Monetary benefits were estimated by deriving the lifetime earnings differential associated with training. Since the large majority of students in the programs were females, only the earnings of females were considered in the analysis. Three earnings profiles were used to derive earnings differentials. The analysis focused primarily on earnings profile A which assumed full-time employment from graduation to retirement at age 65 and earnings profile C which represented real-world average earnings.

Monetary returns were measured in terms of payback periods, net discounted present values, benefit/cost ratios and internal rates of return. The minimum acceptable rates of return were set at 5 and 10 per cent for social and private monetary returns, respectively.

The analysis revealed substantial differences in the monetary returns among the 12 training programs. Several programs actually yielded negative returns. Differences were also found in the monetary returns among the three years of the study. The analysis also revealed that the higher labour force participation rate for females with training tended to improve the monetary returns for those programs which yielded negative returns using the assumption of full-time employment for both health personnel and their reference group.

A major conclusion of the study was that critical differences in social and private monetary returns existed among the programs. Five programs yielded returns above the minimum acceptable rate of return. Three programs consistently yielded monetary returns below the minimum acceptable rate of return. The remaining four programs yielded inconsistent returns.

The findings of the study also supported several conclusions of relevance to the human capital research program, including the strengths and weaknesses of the various methods of measuring monetary returns.

Implications were drawn with respect to the administration of non-university health personnel training in the Province of Saskatchewan and the human capital research program. Suggestions for further research were put forth concerning the theory of human capital and further empirical work on monetary returns to training.

ACKNOWLEDGEMENTS

The writer wishes to thank Dr. D. Friesen, thesis supervisor, and Dr. D. M. Richards for their assistance and advice throughout the course of the study. Appreciation is also extended to Dr. C. Preitz, Dr. J.M. Small and Dr. E. Ingram and Dr. Richard Rossmiller for their contributions.

The assistance provided by the Government of Saskatchewan and particularly by the Department of Continuing Education is gratefully acknowledged. The writer was provided with education leave and an education leave allowance to undertake doctoral studies. Moreover, access to government records, computer time and programming, and various office services were also made available.

Gratitude is expressed to Dr. A. J. Y. Guy, Deputy Minister of Continuing Education, and to Dr. P. A. R. Glynn, Director of the Policy Planning Branch, for their interest and cooperation throughout the doctoral program.

The writer would like to give general recognition to the support provided by numerous individuals within the Department of Continuing Education's central office and within the Kelsey and Wascana Institutes of Applied Arts and Sciences. Appreciation is extended to the staff of the Policy Planning Branch who took the time to listen and comment on many aspects of the study. Thanks go to Mr. Anthony Mazyn who demonstrated much expertise and diligence in preparing the necessary computer programming for the study.

The writer also wishes to express his sincere appreciation to Eileen Ewasienko, Diane Panagabko and Norma Leslie for their perseverance and dedication throughout the typing of the thesis.

At this time, the writer would like to thank his parents for their encouragement and support throughout many years of education. The writer is also grateful for the interest and support provided by his brothers, sisters and wife's parents throughout the period of doctoral study. Special thanks go to the writer's sister, Colleen, who came to Edmonton to help out at a critical point during the writer's doctoral program.

Finally, the writer wishes to give particular recognition to the involvement of his wife and two sons in making the doctoral program possible. The patience shown by Trevor and Curtis and their own ways of indicating support deserve a special note of thanks. The writer wishes to express deep appreciation to his wife Rose for her understanding, assistance and encouragement. Without her tremendous support, the present study and the entire doctoral program would have been impossible.

TABLE OF CONTENTS

Page

LIST OF TABLES xvi

LIST OF FIGURES xxiv

Chapter

1. THE NATURE AND PURPOSE OF THE STUDY 1

    INTRODUCTION 1

    THE PROBLEM 3

        Research Questions 4

        Sub-Problems 4

    DEFINITION OF TERMS 5

    SCOPE OF THE STUDY 8

        Institutions Involved 8

        Programs Involved 9

    OVERVIEW OF THE RESEARCH DESIGN 10

        Basic Methodology 10

        Restricted View of Training 11

    IMPORTANCE OF THE STUDY 11

        Importance to Human Capital Literature 11

        Importance to Educational Planning and Policymaking 13

    DELIMITATIONS OF THE STUDY 14

    ASSUMPTIONS 14

    LIMITATIONS OF THE STUDY 15

    ORGANIZATION OF THE STUDY 16

Chapter Page

2. THE ANALYTICAL FRAMEWORK AND REVIEW OF RELATED LITERATURE 17

THEORY OF HUMAN CAPITAL 17

Nature of the Theory 17

Fundamental Issues 19

THE ANALYTICAL FRAMEWORK PROVIDED BY THE THEORY OF HUMAN CAPITAL 21

Costs of Education 21

Estimating the Costs of Education 25

Benefits of Education 27

Measuring the Monetary Benefits 30

Applicability of Cost-Benefit Analysis 40

THE THEORY OF HUMAN CAPITAL AND EDUCATIONAL PLANNING 42

EMPIRICAL RESULTS AND RESEARCH NEEDS 46

Empirical Results 47

Research Needs 50

SUMMARY OF CHAPTER 2 55

3. THE METHODOLOGY FOR ESTIMATING COSTS 57

OVERVIEW OF THE COSTING METHODOLOGY 57

The Costing Approach 57

Particular Features of the Costing Approach 58

EDUCATIONAL INSTITUTION COSTS 61

Direct Instructional Costs 62

Indirect Instructional Costs 68

Physical Plant Costs 70

Central Department Costs 71

Total and Net Educational Institution Costs 72

Chapter Page

FOREGONE EARNINGS OF STUDENTS 73

Reference Groups 73

Foregone Earnings Data 74

Estimation of Net Foregone Earnings 75

Before and After-Tax Net Foregone Earnings 77

GOVERNMENT SUBSIDIES TO STUDENTS 77

Interest Charges on Canada Student Loans 77

Saskatchewan Student Bursaries 78

Canada Manpower Training Allowances 78

STUDENT EDUCATIONAL COSTS 79

Tuition Fees 80

Other Educational Costs 80

IMPUTED COSTS OF INTEREST ON PHYSICAL PLANT AND OF PROPERTY TAX EXEMPTIONS 80

Interest on Physical Plant 81

Property Tax Exemptions 81

SOCIAL AND PRIVATE COSTS 82

Social Costs of Training 82

Private Costs of Training 84

SUMMARY OF CHAPTER 3 84

4. THE METHODOLOGY FOR CONSTRUCTING EARNINGS PROFILES AND MEASURING RETURNS ON INVESTMENT 86

BASIC EARNINGS DATA FOR HEALTH PERSONNEL 87

Use of Collective Bargaining Agreements 87

Procedures Adopted in Using Salary Scales 88

Chapter Page

BASIC EARNINGS DATA FOR THE REFERENCE GROUPS 91

Grade 12 and Grade 11 Reference Groups 92

Registered Nurse Reference Group 92

ADJUSTMENTS FOR LABOUR FORCE ACTIVITY 92

Adjustment for Survival 93

Adjustment for Labour Force Participation 93

Adjustment for Employment 94

Adjustment for Full-Time Versus Part-Time Employment 95

Adjustment for the Workload of Part-Time Employees 96

CONSTRUCTION OF THE EARNINGS PROFILES 98

Earnings Profile A 100

Earnings Profile B 100

Earnings Profile C 101

MEASUREMENT OF THE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 102

Payback Period 103

Net Discounted Present Value 103

Benefit/Cost Ratio 105

Internal Rate of Return 106

Commentary on the Approaches 106

SUMMARY OF CHAPTER 4 109

5. THE COSTS OF HEALTH PERSONNEL TRAINING 110

EDUCATIONAL INSTITUTION COSTS 110

Two Year Programs 111

Once Year or Less Programs 116

Chapter Page

FOREGONE EARNINGS OF STUDENTS 122

Basic Data and Adjustments 122

Net Foregone Earnings by Programs 125

GOVERNMENT SUBSIDIES TO STUDENTS 127

Interest Charges on Canada Student Loans 127

Saskatchewan Student Bursaries 127

Training Allowances 127

STUDENT EDUCATIONAL COSTS 130

IMPUTED COSTS OF INTEREST ON PHYSICAL PLANT AND OF PROPERTY TAX EXEMPTIONS 130

SOCIAL COSTS OF HEALTH PERSONNEL TRAINING 133

Two Year Programs 133

One Year or Less Programs 138

PRIVATE COSTS OF HEALTH PERSONNEL TRAINING 143

Two Year Programs 143

One Year Programs 145

Operating Room Nursing 146

SUMMARY OF CHAPTER 5 147

6. THE EARNINGS PROFILES FOR HEALTH PERSONNEL AND THEIR REFERENCE GROUPS 149

BASIC EARNINGS OF HEALTH PERSONNEL AND THEIR REFERENCE GROUPS 149

Health Personnel Classifications 149

Reference Groups 152

Chapter Page

LABOUR FORCE ACTIVITY PATTERNS 153

Survival Rates 154

Labour Force Participation Rates 154

Employment Rates 157

Full-Time or Part-Time Employment 159

Workload of Part-Time Employees 159

Relative Effect of Labour Force Activity Adjustments 159

OVERVIEW OF THE EARNINGS PROFILES 161

Health Personnel 161

Grade 12 and 11 Reference Groups 164

Effects on Earnings Differentials 164

SUMMARY OF CHAPTER 6 165

7. SOCIAL MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 167

SOCIAL LIFETIME EARNINGS DIFFERENTIALS FOR HEALTH PERSONNEL 168

Findings Using Earnings Profile A 168

Findings Using Earnings Profile C 172

MEASUREMENT OF THE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 173

Findings Using Earnings Profile A 174

Findings Using Earnings Profile C 180

SUMMARY OF CHAPTER 7 186

8. PRIVATE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 189

PRIVATE LIFETIME EARNINGS DIFFERENTIALS FOR HEALTH PERSONNEL 189

Findings Using Earnings Profile A 190

Findings Using Earnings Profile C 192

Chapter Page

MEASUREMENT OF THE PRIVATE RETURNS TO SELF-SUPPORTING STUDENTS 196

Findings Using Earnings Profile A 196

Findings Using Earnings Profile C 201

MEASUREMENT OF THE PRIVATE RETURNS TO BURSARY RECIPIENTS 206

MEASUREMENT OF THE PRIVATE RETURNS TO ALLOWANCE RECIPIENTS 210

Findings Using Earnings Profile A 210

Findings Using Earnings Profile C 212

SUMMARY OF CHAPTER 8 216

9. SUMMARY, CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH 218

OVERVIEW OF THE STUDY 218

Research Questions 218

Research Methodology 219

SUMMARY OF MAJOR FINDINGS 221

Monetary Costs of Training 221

Monetary Benefits of Training 223

Monetary Returns on Investment 225

CONCLUSIONS 229

Monetary Returns to Health Personnel Training . . . 229

Human Capital Research Program 234

IMPLICATIONS 237

Administration of Health Personnel Training 238

Salary Determination in the Health Care Sector . . . 240

Career Counseling 241

Human Capital Research Program 242

Chapter Page

SUGGESTIONS FOR FURTHER RESEARCH 243

BIBLIOGRAPHY 246

APPENDIX A: CORRESPONDENCE INITIATING THE STUDY 257

APPENDIX B: CORRESPONDENCE REGARDING SPECIFIC DATA REQUESTS 262

APPENDIX C: BRIEF DESCRIPTION OF THE HEALTH PERSONNEL TRAINING PROGRAMS 275

APPENDIX D: ENROLMENT AND GRADUATION STATISTICS 281

APPENDIX E: DISCUSSION OF STUDENT ATTRITION AND THE DERIVATION OF PER GRADUATE COSTS IN TWO YEAR PROGRAMS 287

APPENDIX F: DISCUSSION OF THE USE OF THE INDUSTRIAL COMPOSITE INDEX 293

APPENDIX G: AGE-EARNINGS DATA FOR THE GRADE 12 AND GRADE 11 REFERENCE GROUPS 301

APPENDIX H: INCOME TAX ADJUSTMENT 304

APPENDIX I: METHODOLOGY USED TO ESTIMATE PHYSICAL PLANT RELATED COSTS AT THE DENTAL DIVISION, WASCANA INSTITUTE 307

APPENDIX J: SUPPLEMENTARY COST DATA 313

APPENDIX K: PER STUDENT AND PER GRADUATE EDUCATIONAL INSTITUTION COSTS 324

APPENDIX L: SOCIAL COSTS OF NURSING ASSISTANT AND DENTAL ASSISTANT PROGRAMS USING A GRADE 11 REFERENCE GROUP 329

APPENDIX M: ESTIMATED LIFETIME SOCIAL EARNINGS DIFFERENTIALS 332

APPENDIX N: ESTIMATED LIFETIME PRIVATE EARNINGS DIFFERENTIALS 337

APPENDIX O: SOCIAL MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 342

APPENDIX P: PRIVATE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING 358

LIST OF TABLES

Table Page

1. Rates of Return from Selected Studies 49
2. Total Educational Institution Costs by Cost Component, Program and Year, Two Year Programs 112
3. Educational Institution Per Student and Per Graduate Costs by Program and Year, Two Year Programs 114
4. Total Educational Institution Costs, Tuition Fee Revenue and Net Educational Institution Costs by Program and Year, Two Year Programs 117
5. Total Educational Institution Costs by Cost Component, Program and Year, One Year or Less Programs 118
6. Educational Institution Per Student and Per Graduate Costs by Program and Year, One Year or Less Programs 120
7. Total Educational Institution Costs, Tuition Fee Revenue and Net Educational Institution Costs by Program and Year, One Year or Less Programs 123
8. Derivation of the Net Foregone Earnings of Students Using Grade 12 and Grade 11 Reference Groups by Year 124
9. Net Foregone Earnings Per Student by Program and Year . . 126
10. Percentage of Post-Secondary Students Awarded Canada Student Loans, Average Amount of Awards and Interest Rate on Loans by Year 128
11. Percentage of Post-Secondary Students Awarded Saskatchewan Student Bursaries and Average Amount of Award by Year 128
12. Cost of Canada Manpower Training Allowances by Program and Year 129
13. Student Costs for Fees and Other Educational Expenses by Program and Year 131
14. Imputed Costs of Foregone Interest on Investment in Physical Plant and of Property Tax Exemptions by Program and Year 132

Table Page

15. Total Social Costs of Health Personnel Training by Program and Year, Two Year Programs 134

16. Per Student Social Costs of Health Personnel Training by Program and Year, Two Year Programs 135

17. Per Graduate Social Costs of Health Personnel Training by Program and Year, Two Year Programs 137

18. Social Costs of Health Personnel Training by Program and Year, One Year or Less Programs 139

19. Per Student Social Costs of Health Personnel Training by Program and Year, One Year or Less Programs 140

20. Per Graduate Social Costs of Health Personnel Training by Program and Year, One Year or Less Programs 142

21. The Private Costs of Health Personnel Training by Program Category, Type of Student and Year 144

22. Annual Before-Tax Earnings of Health Personnel by Health Personnel Classification and Year 150

23. Annual Before-Tax Earnings of Saskatchewan Females Working as Wage Earners on a Full-Time, Full-Year Basis by Educational Level, Age Category and Year . . . 153

24. Survival Rates for a Cohort of Saskatchewan Females at Age 20 155

25. Labour Force Participation Rates for Saskatchewan Females by Age Category and Educational Level, 1976 156

26. Employment Rates for Saskatchewan Females by Age Category and Educational Level, 1976 158

27. Employment Distribution, Average Hours Worked Per Week and Relative Workloads by Full-Time and Part-Time Employees, 1977 160

28. Average Before-Tax Earnings of Health Personnel at Selected Ages Using Earnings Profiles A, B, and C, 1976 162

29. Average Before-Tax Earnings of the Grade 12 and 11 Reference Groups at Selected Ages Using Earnings Profiles A, B, and C, 1976 163

Table Page

30. Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profiles A and C by Training Program and Year 169

31. Lifetime Social Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group by Earnings Profile and Training Program 171

32. Average Social Monetary Returns to Health Personnel Training Using Earnings Profile A by Training Program and Year 175

33. Average Social Monetary Returns to Health Personnel Training Using Earnings Profile C by Training Program and Year 181

34. Average Social Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group by Earnings Profile, Training Program and Year 182

35. Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile A by Training Program and Year 191

36. Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile C by Training Program and Year 193

37. Lifetime Private Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group by Earnings Profile, Type of Student and Year 195

38. Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students Using Earnings Profile A by Training Program and Year 197

39. Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students Using Earnings Profile C by Training Program and Year 202

40. Average Private Monetary Returns to Health Personnel Training for Bursary Recipients Using Earnings Profile A by Training Program and Year 207

41. Average Private Monetary Returns to Health Personnel Training for Bursary Recipients Using Earnings Profile C by Training Program and Year 208

Table Page

42. Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Earnings Profile A by Training Program 211

43. Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Earnings Profile C by Training Program 213

44. Average Private Monetary Returns to Nursing Assistants and Dental Assistant Training Using a Grade 11 Reference Group and Earnings Profile A by Type of Student and Year 214

45. Average Private Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group and Earnings Profile C by Type of Student and Year 215

Appendices

46. Number of Enrollees and Graduates, Two Year Programs . . 282

47. Number of Enrollees and Graduates, One Year or Less Programs 283

48. Age Distribution of Health Science Students and Average Age of Graduates, 1976 284

49. Percentage of Health Science Graduates Who Were Females 285

50. Percentage of Students Having Grade 12 in Grade 11 Prerequisite Programs, 1975 286

51. Attrition Rates in Two Year Programs 291

52. Adjustment Factors Used in Deriving Revised Social Costs in Two Year Programs for the Per Graduate Cost Calculations 292

53. Industrial Composite Index for Saskatchewan Showing Percentage Increases Over 1970 298

54. Average Annual Wages, Salaries and Supplementary Income and Percentage Increases Over 1970 299

55. Percentage Increase in Average Monthly Wages of Farm Help in Saskatchewan (Without Board) Compared to Industrial Composite Index 300

Table Page

56. Estimated Gross Earnings of Saskatchewan Females with a Grade 12 Level of Education Working on a Full-Time Full-Year Basis by Age Category and Year 302

57. Estimated Gross Earnings of Saskatchewan Females with a Grade 11 Level of Education Working on a Full-Time Full-Year Basis by Age Category and Year 303

58. Income Tax Calculations: A Sample 306

59. Cost of Renovations and Annual Use Charge for Dental Division, Wascana Institute 311

60. Annual Maintenance and Operations Rate (Dollars Per Square Foot) 312

61. Annual use Charges for Program Specific Equipment Included in Direct Instructional Costs 314

62. Annual Use Charges for Overhead Equipment Included in Indirect Instructional Cost 315

63. Distribution of Health Sciences Student Training Days as Percentage of Total Health Sciences Student Training Days and Total Institute Student Training Days, Kelsey Institute 316

64. Distribution of Health Sciences Student Training Days as Percentage of Total Health Sciences Student Training Days and Total Institute Student Training Days, Wascana Institute 317

65. Distribution of Dental Division Student Training Days as Percentage of Total Dental Division Student Training Days and Total Institute Student Training Days, Wascana Institute, Dental Division 318

66. Construction Costs and Derived Annual Use Charges for Kelsey Institute and Wascana Institute, Parkway Campus 319

67. Total Physical Plant Costs for Kelsey Institute and Wascana Institute, Parkway Campus 320

68. Space Occupied by Health Sciences Programs as a Proportion of Total Institute Space 321

69. Proration of Relevant Central Department of Continuing Education Costs to Institutes 322

Table Page

70. Price Index for Recreation, Education and Reading 323

71. Educational Institution Costs Per Student by Program, Two Year Programs 325

72. Educational Institution Costs Per Graduate by Program, Two Year Programs 326

73. Educational Institution Costs Per Student by Program, One Year or Less Programs 327

74. Educational Institution Costs Per Graduate by Program, One Year or Less Programs 328

75. Social Costs of the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group . . 330

76. Per Student Social Costs and Per Graduate Social Costs for the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group 331

77. Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile A with Alternative Cost Bases and Alpha Coefficients 333

78. Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile B with Alternative Cost Bases and Alpha Coefficients 334

79. Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile C with Alternative Cost Bases and Alpha Coefficients 335

80. Estimated Lifetime Social Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group with Alternative Earnings Profiles, Cost Bases and Alpha Coefficients 336

81. Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile A by Alpha Coefficient and Type of Student 338

82. Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile B by Alpha Coefficient and Type of Student 339

83. Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile C by Alpha Coefficient and Type of Student 340

Table Page

84. Estimated Lifetime Private Earnings Differentials by Type of Student for the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earning Profiles and Alpha Coefficients 341

85. Average Social Monetary Returns to Health Personnel Training Using Earnings Profile A with Alternative Cost Bases and Alpha Coefficients 343

86. Average Social Monetary Returns to Health Personnel Training Using Earnings Profile B with Alternative Cost Bases and Alpha Coefficients 347

87. Average Social Monetary Returns to Health Personnel Training Using Earnings Profile C with Alternative Cost Bases and Alpha Coefficients 351

88. Average Social Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group with Alternative Earnings Profiles, Cost Bases and Alpha Coefficients 355

89. Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile A with Alternative Alpha Coefficients 359

90. Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile B with Alternative Alpha Coefficients 362

91. Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile C with Alternative Alpha Coefficients 365

92. Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Alternative Earnings Profiles and Alpha Coefficients 368

93. Average Private Monetary Returns to Self-Supporting Students in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profile and Alpha Coefficients 371

Table Page

94. Average Private Monetary Returns to Bursary Recipients in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profiles and Alpha Coefficients 372

95. Average Private Monetary Returns to Allowance Recipients in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profiles and Alpha Coefficients 373

LIST OF FIGURES

Figure Page

1. The Earnings Profile Construction Process 99

Chapter 1

THE NATURE AND PURPOSE OF THE STUDY

INTRODUCTION

Resource allocation in post-secondary education has been a matter of rising concern throughout the 1970's. At the beginning of the decade, the Economic Council of Canada (1971:223) pointed out that:

> Expenditures on education have reached a level such that continued growth at the rate experienced during the 1960's is no longer possible or appropriate, particularly in the light of the growing volume of other demands on our limited productive resources. Consequently, it is becoming increasingly important . . . to improve the efficiency and effectiveness of our educational systems and to seek less costly alternative approaches to upgrading the educational level of our population and labour force.

Pressures for a closer scrutiny of resource allocation intensified during the decade. Now, in the latter part of the 1970's, the Economic Council of Canada (1978:108) states "there will likely have to be more discriminating funding priorities and shifts in resource allocation among programs . . . " in order to meet the emerging educational needs of Canadians.

Given this context, an analysis of the investment in non-university health personnel training may be most appropriate. In Saskatchewan, this training area constituted about one-third of the operating expenditure of the Institutes of Applied Arts and Sciences in 1976-77. Moreover, as Statistics Canada (1978:23) reports, nearly one half of the employed human resources in post-secondary programs in these Institutes were in health personnel training programs.

Investment in non-university health personnel training within post-secondary educational systems increased throughout the 1960's and early 1970's. The allocation of ever-increasing resources to this training area was largely attributable to the rapid growth in requirements for health personnel in the labour force, the transfer of on-the-job hospital based programs to educational institutions, and to the emergence of many new training areas.

The tradition of growth in the non-university health personnel training area coupled with the intense pressures to scrutinize educational expenditures more carefully suggests much controversy for the future. Commenting on much the same situation in the United States, Millett (1978:7) observes "that health care education promises to be a battleground throughout the 1980's."

Therefore, the availability of information on the magnitude of the investment in non-university health personnel training and on the monetary returns from this investment appears to be both timely and appropriate. The present study examines these aspects by focusing on the monetary costs and monetary benefits associated with health personnel training in the Province of Saskatchewan.

The present study may be useful for both educational policy-making and career counseling. The results should provide policymakers with indicators as to the efficiency of resource allocation to health personnel training. The study may be useful to prospective students as monetary returns are influential, among many other factors, in making career decisions. In essence, an analysis of investment in education has widespread importance. Kerr (1975:xv) makes this point when he states:

> From the private citizen who must decide how much to invest in higher education, to the government official who is charged with the planning and implementation of public policy, most of us are faced at one time or another with investment decisions regarding education.

THE PROBLEM

The major objective of this study was to examine the monetary returns on investment in non-university health personnel training in the Province of Saskatchewan. The theory of human capital provided the analytical framework for the study. According to this theory, expenditures on training represent a form of investment since training leads to higher future earnings. Thus the central focus of the study was on the relationship between the monetary costs and monetary benefits of training. A total of 12 non-university health personnel training programs were included in the study.

Monetary costs and benefits were estimated from both the perspective of the individual (private) and from the perspective of society (social). The analysis was conducted using cost and earnings data for 1974, 1975 and 1976.

Since the large majority of students in the training programs were females, the monetary returns to males were not considered in the study. Much attention was directed towards an analysis of the earnings and labour force activity patterns of females. Three earnings profiles were used in the estimation of monetary returns. Earnings profile A assumed full-time employment from the time of graduation until retirement at age 65. Earnings profile B included adjustments for the probability of survival and employment. Earnings profile C was designed to reflect real-world average earnings by incorporating five adjustments for labour force activity.

Research Questions

The examination of monetary returns on investment in health personnel training involved three major research questions:

1. What were the monetary costs of training for each of the 12 health personnel training programs in 1974, 1975 and 1976?

2. What were the monetary benefits, in the form of earnings differentials, for each of the 12 health personnel training programs using earnings data for 1974, 1975 and 1976?

3. What were the relationships between monetary benefits and monetary costs, measured in terms of payback periods, net discounted present values, benefit/cost ratios and internal rates of return?

Sub-Problems

More specifically, the following sub-problems were addressed in this study:

1. What were the total social costs?
2. What was the distribution of social costs by cost component?
3. What were the per student social costs?
4. What were the per graduate social costs?

5. What were the private costs to self-supporting students?

6. What were the private costs to bursary recipients?

7. What were the private costs to allowance recipients?

8. What were the social lifetime earnings differentials using earnings profile A, B and C?

9. What were the private lifetime earnings differentials for self-supporting students, bursary recipients and allowance recipients using earnings profiles A, B and C?

10. What were the payback periods, net discounted present values, benefit/cost ratios and internal rates of return from the social and private perspectives?

11. How did the social and private monetary returns compare among the programs and years under review?

12. What were the differences in social and private monetary returns using the three earnings profiles?

13. What were the differences in private monetary returns among self-supporting students, bursary recipients and allowance recipients?

14. How did the internal rates of return in this study compare with the findings of other similar studies?

Sub-problems 1 to 10 were addressed for each training program in each year of the study.

DEFINITION OF TERMS

The following presents definitions for several key terms which are used in this study. Other terms are defined as they are introduced in the methodology chapters.

Monetary returns refer to monetary benefits as compared to monetary costs. Monetary returns were expressed either in dollars (benefits minus costs) or in terms of a measure of the relationship between the benefits and costs. The four measures of monetary returns used in this study were payback period, net discounted present value, benefit/cost ratio and internal rate of return.

Social costs consisted of: (1) net educational institution costs, (2) net foregone earnings of students, (3) student educational costs, (4) government subsidies to students, and (5) imputed costs pertaining to interest charges on the physical plant and to property tax exemptions.

Private costs consisted of: (1) net foregone earnings after tax, and (2) student educational costs. Private costs were computed separately for self-supporting students, bursary recipients and allowance recipients.

Self-supporting students. This term was used to refer to students who did not receive a Saskatchewan Student Bursary or a Canada Manpower training allowance.

Bursary recipients were those students who received a Saskatchewan Student Bursary.

Allowance recipients were those students who received a training allowance from the Department of Manpower and Immigration (referred to herein as Canada Manpower).

Reference group. This term was used to refer to the particular subset of persons from the Saskatchewan labour force who had the same educational level and who were of the same age and sex as persons entering a given health personnel training program. The earnings of the reference group were used to estimate foregone earnings of students and to calculate the earnings differentials for health personnel.

Primary reference group. This term was used to refer to the most relevant reference group for each training program. The grade 12 reference group was the primary reference group for all programs except operating room nursing. The registered nurse reference group was the primary reference group for operating room nursing.

Grade 12 reference group. This term was used to refer to Saskatchewan females with a grade 12 level of education who worked on a full-time, full-year basis as wage earners. The "grade 12 level" was defined in the various source documents to include persons who had attended or completed grade 12 or 13.

Grade 11 reference group. This term was used to refer to the Saskatchewan females with a grade 11 level of education who worked on a full-time, full-year basis as wage earners. The "grade 11 level" was defined in the various source documents to include persons who had attended or completed grade 11. This reference group was used to conduct special analyses for the nursing assistant and dental assistant programs as the formal entrance requirement to these programs was grade 11. In practice the vast majority of enrollees had completed grade 12.

Registered nurse reference group. This term was used to refer to Saskatchewan registered nurses who worked on a full-time basis in general duty positions.

Earnings differential. This term was used to refer to the difference in earnings between health personnel and their reference group after considering the costs of training. Differentials used in the social calculations were based on before-tax earnings, whereas differentials used in the private calculations were based on after-tax earnings.

Payback period. The payback period refers to the number of years required to recover an initial cash outlay at a zero per cent discount rate.

Discount rate. The discount rate is the rate by which a sum of money to be received in the future must be reduced in order to reflect the "time-value" of money.

Net discounted present value. The net discounted present value refers to the value in current dollars of a sum of money receivable in the future when discounted at a selected rate.

Benefit/cost ratio. The benefit/cost ratio refers to the present value of the future net cash flow over the initial cash outlay. This is also known as the profitability index.

Internal rate of return. The internal rate of return is the derived rate which equates the present value of the expected cash outflows with the present value of the expected cash inflows.

SCOPE OF THE STUDY

A total of 12 non-university health personnel training programs were included in the study. The following section presents a brief description of the educational institutions and programs involved.

Institutions Involved

The non-university health personnel training programs were offered by the Kelsey Institute of Applied Arts and Sciences, Saskatoon and the Wascana Institute of Applied Arts and Sciences, Regina (referred to herein as Kelsey and Wascana, respectively). The diploma nursing, nursing assistant and dental assistant programs were offered at each Institute. The remaining programs were offered in either Kelsey or Wascana.

The Institutes of Applied Arts and Sciences were directly administered by the Government of Saskatchewan. The main administrative responsibility rested with the Department of Continuing Education.

Programs Involved

A brief overview of each of the 12 health personnel training programs included in this study is presented below. Additional descriptive material on each program is presented in Appendix C. Enrolment and graduation statistics are included in Appendix D.

Program	Institute	Length	Working Title of Graduate
1. Diploma Nursing	Kelsey	2 years	Registered Nurse
2. Diploma Nursing	Wascana	2 years	Registered Nurse
3. Psychiatric Nursing	Wascana	2 years	Registered Psychiatric Nurse
4. Dental Nursing	Wascana	2 years	Dental Nurse
5. Health Record Administrator	Wascana	2 years	Health Record Administrator
6. Nursing Assistant	Kelsey	1 year	Certified Nursing Assistant
7. Nursing Assistant	Wascana	1 year	Certified Nursing Assistant
8. Dental Assistant	Kelsey	1 year	Certified Dental Assistant
9. Dental Assistant	Wascana	1 year	Certified Dental Assistant
10. Medical Laboratory Technology	Kelsey	1 year	Medical Laboratory Technologist
11. Combined Technician	Kelsey	1 year	Certified Combined Technician
12. Operating Room Nursing	Wascana	1 semester	Operating Room Nurse

OVERVIEW OF THE RESEARCH DESIGN

While the research design is fully described in chapters 3 and 4, a brief synopsis is appropriate here in explaining the nature of the study.

Basic Methodology

This study used the basic benefit-cost methodology which has been adopted in many human capital studies to date. Bowman (1969:649-650) describes the skeleton of this methodology as having two parts: (1) the comparison of expected life-income streams in pursuing one course (e.g. a higher level of education) with the stream expected from an alternate course (e.g. not pursuing a higher level of education), and (2) a procedure for adjusting the timing of income so that streams with different "shapes" over time can be compared. In the application of this methodology to formal training, the first part of the income stream is negative to account for foregone earnings and direct outlays on educational expenses.

While more complex models have emerged to assess the benefit-cost relationship, particularly linear programming models, the superiority of such models is dependent upon the availability of quantitative data. But, as Bowen (1977:24) observes, "we are a long way from having adequate quantitative data . . ." in education. The use of a simpler methodology, therefore, is supported on practical grounds. Moreover, Bowman (1969:660) argues that the simpler form of benefit-cost analysis can tell as much as the more elaborate procedures when only a part of the educational system is being examined.

Restricted View of Training

The benefit-cost methodology adopted in this study focused on the monetary benefits of training, in the form of lifetime earnings differentials, and the monetary costs of training. Costs and benefits were estimated from the social and private standpoints. While the idea of training as an investment is well grounded in the theory of human capital, an investment orientation is clearly a restricted view of training. This orientation does not take into account the many types of benefits apart from the earnings differentials associated with training. Nevertheless, as is further discussed in chapter 2, an investment analysis of training does permit the quantification of one of the multiple effects of training.

IMPORTANCE OF THE STUDY

The importance of the study lies in its contribution to the empirical literature pertaining to the theory of human capital and in its relevance to educational planning and policymaking.

Importance to Human Capital Literature

The literature relative to the theory of human capital includes many identified research needs which are reviewed in chapter 2. A brief review of four research needs relevant to this study is appropriate at this point.

First, there is support in the literature for human capital studies on the basis of specific fields of study and occupational training areas. Much of the empirical data presently available provide rates of return on a highly aggregated basis such as by broad educational level (e.g. elementary, secondary, undergraduate and graduate). Aggregate results, however, have been found to obscure differences which are relevant from both theoretical and practical standpoints. The present study should add to the existing body of knowledge by providing a disaggregation in terms of twelve specific health training programs.

Second, the need for improved cost data in human capital studies has been identified. The present study may make a contribution in this area since a program cost analysis was part of the research design.

Third, the literature suggests there is a need to monitor rates of return on investment in human capital over time. This consideration becomes particularly important in the health personnel training area given the rapid expansion in the past decade. While the present study does not really provide longitudinal results, the three year perspective should provide a clearer understanding of the sensitivity of rates of return to changing circumstances. The study may provide useful baseline data for future comparisons since no other study to date appears to have estimated the rates of return to non-university health personnel training in Canada.

Fourth, there is support for greater attention to educational investment in females. The present study should make a contribution to the empirical literature because the large majority of students in the training programs were females. Moreover, monetary returns to training were estimated using real-world labour force activity patterns for females.

Importance to Educational Planning and Policymaking

Educational planning relative to health personnel training in Canada has been largely dominated by the manpower requirements approach. The orientation is evident in the numerous manpower oriented conferences (e.g. the two national health manpower conferences between 1969 and 1972), the establishment of a Federal-Provincial Advisory Committee on Health Manpower, and the establishment of interdepartmental health manpower committees in various provinces in the past decade.

However, as noted later in the review of literature, the manpower requirements approach is only one approach to educational planning. While being the most popular approach, the manpower requirements approach has received much criticism because of its failure to give sufficient attention to the costs of manpower development. Given the existing pressures to scrutinize the allocation of resources more carefully within post-secondary systems, an investment analysis of training may provide a useful complement to the manpower orientation. The results of the present study may place educational policymakers in a more informed position to make resource allocation decisions.

Since both costs and monetary returns continue to be factors, among many others, affecting career decisions, the present study may also provide useful career counseling information and, thereby, foster more informed career decisions on the part of individuals.

DELIMITATIONS OF THE STUDY

This study was delimited to:

1. Twelve non-university health personnel training programs in the Province of Saskatchewan.

2. Three years: 1974, 1975 and 1976.

3. The monetary costs and monetary benefits associated with health personnel training.

4. The female participants in health personnel training programs.

5. Five cost components: (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) the imputed costs relative to interest on physical plant and property tax exemptions. Other costs, such as the costs borne by health care agencies in the provision of practicum experiences to students, were excluded from the study.

6. The regular earnings of non-supervisory health personnel. Monetary benefits in the form of overtime pay and fringe benefits were excluded.

ASSUMPTIONS

This study rests on several assumptions relative to the theoretical framework, the data, and the estimation procedures. While the assumptions pertaining to the data and the estimation procedures are more thoroughly discussed in the chapters on methodology, the more important assumptions in this respect as well as the assumptions regarding the theoretical framework are summarized below. In particular, it was assumed that:

1. Investment in human capital formation was conceptually similar to investment in physical capital formation.

2. Health personnel training was a form of investment in human capital formation.

3. At least 77 per cent of the earnings differential between persons of differing educational levels could be attributed to the effects of higher education.

4. Earnings differentials between persons of differing educational levels approximates the difference in worker productivity.

5. The use of salary scales in conjunction with labour force activity patterns reflected the actual average earnings of health personnel.

LIMITATIONS OF THE STUDY

The limitations of the study are thoroughly discussed in the chapters on methodology. However, the more important limitations can be summarized as follows:

1. The reporting years among the many data sources were not perfectly consistent.

2. A modified costing methodology for certain cost components for the health sciences and dental divisions of Wascana Institute had to be adopted because of particular circumstances.

3. The income tax adjustment approach was not sensitive to changing tax rates between earnings profiles. In fact, the amount of tax under earnings profile B and C was simply a proportional reduction

from earnings profile A; the proportion being determined by relative gross earnings.

4. Labour force activity data disaggregated for the health personnel groups included in the study were not available.

ORGANIZATION OF THE STUDY

This chapter has presented an introduction to the study. The remainder of the thesis is organized as follows:

Chapter 2 provides the analytical framework and review of related literature.

Chapter 3 describes the methodology used to estimate costs.

Chapter 4 describes the methodology used to construct earnings profiles and to measure returns on investment in health personnel training.

Chapter 5 presents the findings of the study with respect to the costs of health personnel training.

Chapter 6 reports the findings of the study concerning the earnings profiles for health personnel and their reference groups.

Chapter 7 presents the social monetary returns to health personnel training.

Chapter 8 presents the private monetary returns to health personnel training.

Chapter 9 provides the summary, conclusions, implications and suggestions for further research.

Chapter 2

THE ANALYTICAL FRAMEWORK AND REVIEW OF RELATED LITERATURE

The theory of human capital provided the analytical framework for this study. This chapter presents a selected review of the literature pertaining to (1) the nature of the theory, (2) the analytical framework provided by the theory, (3) the theory's relevance to educational planning, and (4) empirical results and research needs relative to the theory of human capital.

THEORY OF HUMAN CAPITAL

While the origins of the theory of human capital can be traced back to Adam Smith and other classical economists, Blaug (1976:827) contends that the "birth" of human capital theory was announced in 1960 by Theodore Schultz. Schultz (1960:571) put forth his central argument as follows:

> I propose to treat education as an investment in man and to treat its consequences as a form of capital. Since education becomes part of the person receiving it, I shall refer to it as human capital. Since it becomes an integral part of the person, it cannot be bought or sold or treated as property under our institutions. Nevertheless, it is a form of capital if it renders a productive service of value to the economy.

Nature of the Theory

Blaug (1976:829) argues that the so-called theory of human capital is a perfect example of a "research program" in that it cannot be reduced to one, single theory. The "hard-core" of the human capital research program, according to Blaug (1976:829), is "the idea that people spend on themselves in diverse ways, not for the sake of present enjoyments, but for the sake of future pecuniary and non-pecuniary returns."

Sahota (1978:11) observes that the theory of human capital has grown into a "colossus," providing a framework for analysis in many branches of economics. However, he also notes that two complementary fronts were evident in the research from the beginning. The first, led by Schultz, Denison and Griliches, used human capital theory to analyze the sources of productivity and economic growth. The second front, led by Becker and Mincer among others, focused on the general theory of human capital and the earnings distribution theory of human capital.

The significance of the theory of human capital within economic thought is well documented. Bowman (1966:103) claims that the emergence of this concept represented somewhat of a "revolution in economic thought." Similarly, Sahota (1978:12) remarks:

> The potentialities of this generalization turned out to be so vast that among the developments in economic thought of the past two decades that satisfy the criteria of Johnsonian intellectual revolutions . . ., or Kuhnian "paradigms" . . ., or Lakatosian "scientific research programmes" . . ., human capital theory perhaps dwarfs all others.

The human capital research program has spawned theoretical formulations in many fields including education, health, job-search migration and income distribution. Sahota (1978:11) observes that in the 1960's the focus was on human investment and growth, but in the 1970's "the income distribution front of human-capital theory is riding the crest of the wave." This latter orientation is evident in the work of Mincer and Polachek (1978), Sandell and Shapiro (1978) and Hirsch (1978) among others.

The analytical framework for the present study is derived from the general theory of human capital as applied to education. Accordingly, the focus of the literature review is on this particular dimension. The importance of this dimension is underscored by Sahota (1978:12) when he observes that among the numerous dimensions of research, education has emerged to be the key to other forms of human investment. Specifically, he argues that:

> The hard core of the 'hard core' of human capital theory has turned out to be education, even though other components . . . also remain important . . . . Indeed human capital theory is often used synonymously with its hard core, the theory of educational investment.

Fundamental Issues

Despite the importance of human capital theory within economic thought, much controversy continues to surround the theory. Two fundamental issues are at the heart of most criticisms. The first issue concerns the extent of similarity between human and physical capital. Bowman (1966:104) argues that Irving Fisher's generalized definition of capital, put forth in his 1906 book, opened the possibility of regarding investment in man as a form of capital. She interprets Fisher's definition as follows:

> Capital is something (a stock) that yields a flow of services over time. Whether the physical entity in which the capital stock is embodied can be bought or sold is . . . not a defining criterion.

Schultz (1971:48) reaffirmed his rationale for regarding investment in man as a form of capital when he stated:

> The distinctive mark of human capital is that it is a part of man. It is human because it is embodied in man, and it is capital because it is a source of future satisfactions, or of future earnings, or of both . . . . It can, of course, be acquired not as an asset that is purchased on a market but by means of investing in oneself.

Shaffer (1961:46), among others, argues that investment in man is essentially different than investment in non-human capital. He maintains that expenditure on the improvement of man is seldom undertaken solely because of future monetary expectations. Moreover, he claims that even when expenditure is made for such purposes "it is rarely if ever 'rational' investment based on a careful comparison of alternate investment opportunities."

The second fundamental issue concerning the theory of human capital is the matter of investment versus consumption. Whereas investment entails the use of resources in anticipation of future satisfactions, consumption entails the use of resources for immediate satisfactions. The central debate is whether education is an end in itself or a means to an end. Only the latter would designate education as a form of investment.

Vaizey (1972:66) maintains that the consumption and investment aspects of education are inseparable and, therefore, the measurement of the investment aspect alone produces estimates with a wide range of inaccuracy. Moreover, he argues that the motives of persons to pursue education cannot be explained by economic factors alone. However, Blaug (1970:20) has strengthened the case for regarding education as an investment by arguing that:

> A large part of what is usually thought of as the consumption component of education is in fact forward-looking, involving the anticipated consumption of the services of a desirable consumer good; motivated as it is by utilities that accrue in the future, it is more akin to investment than to consumption.

Despite the existence of the consumption versus investment debate since the emergence of the theory of human capital, Alexander (1976:437) contends that the issue is still far from being resolved.

In view of the two fundamental issues pertaining to the theory of human capital, a critical caveat must accompany the analysis of education as an investment. The caveat is that such an analysis provides a restricted view of education. Therefore, decision making pertaining to education should not be based solely on the results of investment analyses. But the investment perspective provided by the theory of human capital does not deny that education has objectives and benefits other than those which can be expressed in monetary terms. The central argument supporting an investment perspective, as summed up by Psacharopoulos (1973:17), is "that by treating education as a form of investment we can quantify at least one of its multiple effects."

THE ANALYTICAL FRAMEWORK PROVIDED BY THE THEORY OF HUMAN CAPITAL

The theory of human capital provides a particular framework for the analysis of education. Bowman (1966:103) states:

> In an investment orientation to education we are concerned above all with the relations between the resources utilized to form human competencies (resource costs of education . . .) and the increments to productivity that result.

Bowman goes on to state that an investment orientation entails cost-benefit assessments whether these be from the standpoint of an individual, a government, or society as a whole. These cost-benefit assessments can take a number of forms; although ultimately each is concerned with what might be broadly labelled the return on investment. In the present study four methods were used to measure the return on investment: (1) the payback period, (2) the net discounted present value, (3) the benefit/cost ratio, and (4) the internal rate of return. The perpectives of both the individual (private) and society (social) were included in the analysis.

Costs of Education

Woodhall (1970:15) argues that the measurement of the costs of education for the purposes of cost-benefit analysis involves more than the calculation of money expenditures. Instead, the measurement must involve the total cost of investment in terms of alternative opportunities foregone, either by society as a whole or by the private individual. Both social and private costs can be categorized as to those which require a direct outlay of funds and those which are indirect in nature.

Direct costs. The direct costs to students, what can be labelled the direct private costs, are the easiest to identify. They include tuition and other fees, supplies and books (Cohn, 1972:70; Stager, 1968:16).

Direct costs are much higher from the social standpoint. Woodhall (1972:15) contends that the total resource cost is the relevant cost concept from the social standpoint. Direct social costs include, as Cohn (1972:79) observes, instructional costs, maintenance costs on the physical plant, and subsidies provided to students. Hallak (1969:29) refers to the latter as the cost of encouraging school attendance. This can take a number of forms including bursaries and special allowances provided to students.

Indirect costs. There is now general recognition that indirect costs represent the largest part of the total resource costs at the post-secondary level. Moreover, foregone earnings of students are the single largest indirect cost. Schultz's (1960:577) pioneering work in this area revealed that foregone earnings accounted for about 60 per cent of the total resource costs of college education in the 1950's. Blaug (1970:49) notes that the proportion would have been 75 per cent if viewed from the private standpoint. The Government of Canada (1976:11) has indicated that foregone earnings account for between one half and two thirds of total resource costs of university education in Canada.

Stager (1968:17) observes that while there has been much debate on the principle of including foregone earnings within cost calculations, there now is rather general acceptance of this component. Yet the appropriate value of earnings actually foregone remains a controversial issue. Parsons (1974:262) points out that different methodologies for calculating the value of foregone earnings provide very different results. His review of six major approaches revealed both upward and downward biases when compared to actual time devoted to market-like activities by students.

Several adjustments are essential in deriving the value of foregone earnings. Woodhall (1970:16-17) insists that adjustments must be made for unemployment rates and for subsidies received by students. Stager (1968:100) also includes an adjustment for wages students receive from part-time and summer employment. Finally, there is the matter of income taxes. While no adjustment needs to be included in social cost calculations, only the after-tax earnings are relevant in the case of private costs.

Apart from student foregone earnings, there are two other indirect or opportunity costs which must be considered in social cost calculations. First, as Cohn (1972:94) notes, there is the value of tax exemptions commonly enjoyed by educational intitutions. Accordingly, Stager (1968:14) includes the imputed value of property tax exemptions in his social cost calculations. Second, there is the imputed value of depreciation and foregone interest on investment in the physical plant. Woodhall (1972:16) maintains that a simple depreciation schedule is not sufficient. Such an approach ignores the fact that the physical plant is financed at a single point in time by funds which could otherwise be invested elsewhere to earn interest over a number of years.

Several approaches are reported in the literature for deriving the appropriate imputed value for depreciation and interest on the physical plant. Blaug, Layard and Woodhall (1969) and Nalla Gounden (1967) have amortized the value of a building over a period of time. There is also the approach, as suggested by the National Center for Higher Education Management Systems (NCHEMS) (1977:2.44-2.45), of using an annual use charge on the value of the physical plant and then also including the interest expense on the physical plant. This dual approach was used by Stager (1968) and is also employed in the present study.

Three critical issues arise in using the dual approach of an annual use charge and interest on the physical plant: (1) the life expectancy of the physical plant, (2) the value of the physical plant, and (3) the appropriate interest rate to be applied. NCHEMS (1977:2.44) suggests a life expectancy of 50 years for buildings and 10 years for equipment. Thus the annual use charge would represent two per cent of the value of the physical plant and ten per cent of the value of equipment. Stager (1968:15) identifies three approaches which might be used to establish the value of buildings: original construction cost, current market valuation, and replacement cost. But he also recognizes the impracticality of using anything other than the original construction or purchase cost. Moreover, he points out that the replacement cost approach has a limitation in that quality of construction is not constant over time. The appropriate interest rate represents another area of controversy. If social cost calculations are to reflect total resource costs, the real opportunity cost must be included. NCHEMS's only guidance on the matter is that the rate should reflect an "equitable amount" of interest.

In the present study the NCHMES guidelines for the life expectancy of the physical plant were used. The value of the physical plant was obtained from the original construction costs. The Government of Saskatchewan's borrowing rate was used as the appropriate interest rate.

Estimating the Costs of Education

Rossi, Freeman and Wright (1979:278) provide several guidelines for the estimation of costs for the purpose of cost-benefit analysis. They maintain that the first step is to identify all the cost components. In the present study five cost components were identified: (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) the imputed costs of interest on the physical plant and of property tax exemptions. While all of these cost components were included in the calculation of social costs (with the necessary adjustments to avoid double counting), only foregone earnings and student educational costs were included in the private cost calculations.

The next step in estimating costs, according to Rossi, Freeman and Wright (1979:278), is to detail each of the cost components before gathering the cost data. The breakdown for each cost component in this study was determined in accordance with the review of literature as provided in the previous section.

Rossi, Freeman and Wright (1979:278) provide two guidelines for the collection of cost data. They suggest that the relative effort in gathering data for each cost component should be in proportion to the weighting of each component in the overall cost. Accordingly, in this study the greatest efforts were directed towards estimating educational institution costs and the foregone earnings of students. These authors also suggest that costs should be calculated on the basis of a single calendar year. This approach was followed in the present study.

Although the estimation of costs has long been a major concern in education, Guy (1971:15) notes a resurgence of interest in the use of cost analysis during the 1960's. Moreover, he notes an emphasis on relating costs to some measure of services produced. This type of cost analysis yields data which are generally referred to as unit costs (e.g. per student costs). Such analyses stand in contrast to the conventional accounting practices which generally record costs by object of expenditure.

The appropriate unit for costing is a controversial issue. Hallak (1969:41) identifies two ways of quantifying the production of education (1) by reference to the number of academic successes (graduates), and (2) by reference to the number of students involved. Thus, the controversy largely centers on whether per graduate or per student unit costs should be used. Gonyea (1978:vii) observes that the cost per student is the most commonly used unit cost in education. However, as Hallak (1969:41) argues, only per graduate costs reflect the real costs of graduating persons from a particular program. The volume of economic wastage from dropouts and repeaters is part of per graduate costs. The use of a per graduate cost, however, assumes that no benefits accrue to those persons not completing the program. Woodhall (1972:250) questions this assumption by arguing that:

> While this may be a plausible and convenient assumption with respect to pupils who leave school before even learning to read or to add and subtract numbers, it is a very dubious assumption with respect to those who leave secondary school or the university before completing their courses, for they presumably learned something of value which may improve their earnings.

The debate surrounding the most appropriate unit for costing has much relevance for the present study. The health personnel training programs included in this study were tailored for specific occupations as opposed to providing a general education. Moreover, graduation from the programs was essential to enter the specific occupations. Given this situation, persons not completing the program would gain little from their training and, consequently, the per graduate cost basis was deemed to be the most appropriate in the social cost calculations.

Benefits of Education

The second major concern arising from the theory of human capital pertains to the monetary benefits of education. Bowman (1966:103) observes, that the primary interest lies in the increments to productivity that result from education. However, a broader discussion of the benefits of education is appropriate at this point to ensure that the restricted nature of an investment analysis is recognized.

Education can have direct benefits for the recipients of training in the form of increased earnings. Weisbrod (1962:162-169) points out that education also provides other direct benefits, including (1) the option for further education, (2) increased ability to adjust to changing job opportunities, and (3) the development of skills which enable individuals to perform certain tasks for themselves rather than having to purchase them on the market. Apart from these three categories of direct benefits which all have economic aspects, there are numerous other benefits that are frequently labelled consumption or psychic benefits. These involve the intrinsic satisfaction a person obtains from the educational process.

Psacharopoulos (1973a:32) identifies three ways in which psychic benefits might be included in economic analyses of education. First, an arbitrary estimate might be added to the direct earnings streams. Second, a proportion of the costs of education might be deleted to reflect the fact that not all costs were for investment purposes. Third, the results from such analyses might be interpreted as reflecting direct monetary benefits alone. Psacharopoulos suggests that the third method is perhaps the most legitimate. However, he emphasizes that the results of such studies should be regarded as underestimating the true returns to education.

The indirect benefits of education are even more difficult to identify and, in most cases, they are virtually impossible to measure. Indirect benefits represent benefits which are external to the recipient of training. Both Weisbrod (1962:171-179) and Blaug (1965:243) have provided extensive, though not exhaustive, classifications of such benefits. These classifications include benefits to the educated person's family, fellow workers, and community.

Bowen (1977:22) summarizes the complexity of identifying and measuring the benefits of education as follows:

> Higher education is concerned with matters of intellect, personality and value that simply cannot be rigorously quantified or aggregated by adding up dollar amounts or computing rates of return. To evaluate the diverse outcomes of American higher education presents enormous conceptual and methodological difficulties. The outcomes are numerous, complexly interrelated, often subtle, sometime unintended, unstable over time, difficult to substantiate, sometimes negative, and judged differently by different observers. Just as education itself is an art, so also is the evaluation of education.

In view of the complexity of the matter, generally only the most visible and measurable benefits of education, increased earnings, have been included in benefit-cost analyses to date. The exclusion of both psychic and external benefits has roused intense criticism against the resulting private and, particularly, social rates of return. Vaizey (1972:73) states that social rate of return calculations are "simply investment appraisals and as such are not, by themselves, adequate for decision making in the public education sector." Raymond and Sesnowitz (1975:153) similarly conclude that social rates of return are not accurate enough by themselves to provide precise guidance for policy purposes.

Yet the inability to evaluate all the outcomes of education does not rule out the desirability of measuring in those areas where measurement is possible. Bowen (1977:22) lends support to this argument when he states:

> When we are prudent, we arrive at decisions by acquiring as much information or evidence as possible and then rely on informed judgement--a combination of sensitivity, insight, logical inference, and common sense.

Furthermore, Bowen (1977:24) goes on to recognize that "information on enrolments, earnings of graduates, test scores, and so on are surely part of the evidence on which the outcomes of higher education may be judged."

The importance of focusing on economic benefits, even though they report only part of the total outcomes of education, is put forth by Woodhall (1970:12-13) when she states:

> Once it is recognized that investment in education does produce significant economic benefits, the need to analyse the nature and magnitude of these benefits in relation to costs must also be recognized, even though this concentrates on only part of the total picture . . . . This does not mean that the social, political and cultural consequences of education are unimportant, but that cost-benefit analysis in the present form does not provide an appropriate means of analyzing these consequences.

Measuring the Monetary Benefits

Woodhall (1970:18) argues that a measure of education's expected contribution to future levels of income or output is required in order to evaluate education as an investment. But even this restricted view of benefits poses measurement problems. The difficulties associated with measuring earnings differentials include (1) the earnings data used, (2) the alpha coefficient, (3) the marginal productivity assumption, and (4) the discount rate.

Earnings data. Measuring education's expected contribution to future levels of income involves the estimation of additional lifetime earnings or earnings differentials for educated workers. Ideally, this would require a time-series of data whereby the earnings of educated and non-educated workers (or between levels of education) could be compared. The lifetime earnings differential would then provide an estimate of the increased productivity.

Woodhall (1970:18) recognizes that because no country has a complete set of time-series data, the standard way of measuring earnings differentials is to use cross-sectional data such as that provided by census statistics. There are several criticisms of this approach because it involves constructing a lifetime earnings profile from earnings data at one point in time. Sheehan (1973:50) argues that the reliability of the procedure is dependent upon the relative stability of variables affecting wage levels. However, some research results based on actual longitudinal cohort data have been made available recently. These results provide a basis for the evaluation of the cross-sectional data approach. Taubman and Wales (1974:125-135) conclude that cross-sectional data would have been a good approximation of the actual earnings profiles for the 25 year period in their study. Therefore, the use of cross-sectional data appears to be a defensible approach.

However, even cross-sectional data are not universally available. In the present study, cross-sectional data were not available because the specific occupational groups were not classified separately in the census data. An alternative method reported in the literature is to use salary scales for groups which are covered by collective bargaining agreements (Dibski, 1970; Wallace, 1970; Psacharopoulos, 1973a:25). This method was adopted in the present study.

In the construction of age-earnings profiles from data reflecting one point in time (whether cross-sectional or salary scale data), Hollister (1970:64-65) argues that an adjustment for economic growth should be made. (This adjustment is frequently referred to as the secular growth rate.) Psacharopoulos (1973a:31) notes that the adjustment can be included in two ways. First, future earnings can be multiplied by a factor reflecting the economic growth rate. Second, the growth rate can be considered after the estimated rate of return is calculated by simply adding the expected growth rate to the rate of return. The latter approach was used in the present study in the interpretation of the internal rate of return results. No adjustment for the secular growth rate was included within the payback period, net discounted present value, and benefit/cost ratio analyses.

The appropriate adjustment for secular growth appeared to be between two and four per cent per annum. Two other Canadian studies have made adjustments in this range (The Systems Research Group, 1971 used 2.7 per cent and Holmes, 1974 used 2.1 per cent). More recently, Statistics Canada (1978d:vii) has reported a 3.5 per cent increase in labour productivity in Canada in selected industries over the past 15 years. Therefore, an upwards adjustment of 3 per cent was used in interpreting internal rates of return in the present study.

Also, as Stager (1968:46) notes, several risks and uncertainties must be taken into account in constructing earnings profiles. The important calculable risks are death, non-participation in the labour force and unemployment. These factors were taken into account in the present study through the inclusion of survival rates, labour force participation rates and employment rates.

Another problem area concerning the earnings data pertains to the number of hours worked. Eckaus (1973:8) demonstrates that rates of return can change substantially when earnings are standardized on the basis of hours actually worked. Such an adjustment was not considered necessary in the present study since the collective bargaining agreements for the occupational groups contained virtually the same number of working hours per week.

Alpha coefficient. A second critical issue which arises in measuring the earnings differentials pertains to the proportion of the differential which can be attributed to the effects of education. This proportion has become known in the literature as the alpha coefficient.

The determination of the appropriate alpha coefficient is a matter which, as of yet, is not completely resolved. Blaug (1970:32) points out that the distribution of earnings in society is the outcome of a complex interaction of numerous factors such as sex, race, ability, family circumstances, community environment, length of schooling, quality of schooling, size of employing firm and occupation of employment.

An early attempt to isolate the effect of education on earnings was made by Denison (1962). On the basis of very crude data, he suggested that 60 per cent of earnings differentials could be attributed to education alone.

While much effort in the 1960's and 1970's has been directed towards determining the appropriate alpha coefficient, the results have tended to reveal the complexity of the issue rather than provide an answer. Taubman and Wales (1974:76), for instance, claim that the commonly recognized importance of ability is not entirely correct. They found only mathematical ability had an influence on earnings.

The present state of the art is rather divided on the extent to which variables, other than education, explain differentials in earnings. Blaug (1976:845) remarks:

> After ten years of work on earnings functions all we have is a dim light at the end of a tunnel: everyone has been wrong and everyone has been right because the problem proved to be more complicated than was originally imagined.

Some writers (Taubman and Wales, 1975; Griffin, 1976) insist that rates of return are largely biased upwards if they do not build in specific controls for ability, socio-economic background and other factors. However, other writers (Psacharopoulos, 1975; Griliches and Mason, 1972) argue that the effect of education is even greater than many earlier studies recognized.

In a summary of research on the topic, Psacharopoulos (1975:55) concludes that the research shows mixed results and no definitive statement can yet be made. But, he argues that the weight of the evidence suggests the greatest part of the earnings differentials by education level is in fact linked to education and that the proportion is well above the 60 per cent used in many studies to date. However, the linkage, as Blaug (1976:845) points out, may involve a complex interaction of variables in which education is a critical mediating variable. An international review of research by Psacharopoulos (1975:55) concluded with an overall average of 77 per cent. In other words, as he states, "regardless of the level of education or the ability - plus other factors distinction, education is responsible for over three-quarters of observed earnings differentials."

Marginal productivity. While the theory of human capital is primarily concerned with increments to productivity resulting from education, the measurement of these increments is typically made by focusing on earnings differentials. The assumption is that marginal earnings reflect marginal labour productivity. Woodhall (1970:28-29) remarks that some economists deny this by pointing to rigidities in the labour market, custom and tradition in wage rate determination, the power of trade unions, and the influence of administered wage structures in the public sector. Dibski (1970:72) refers to other types of labour market imperfections which cast doubt on the marginal productivity assumption, including, the collective power held by some professions or sectors, overestimation of education required for the job, "conspicuous consumption" by employing firms, restriction of supply through control of entry to occupations, and inadequate training capacity.

Several economists, including Blaug (1970:205-212) and Woodhall (1970:29), have come to the defense of the marginal productivity assumption. While they admit imperfections exist in the labour market, they argue that complete denial of the marginal assumption is too extreme. The defense of the assumption lies in the recognition of long term forces in the labour market which tend to bring wages and salaries in line with marginal productivity. Blaug and Woodhall insist that the denial of such forces implies the rejection of the price system in the economy. Nevertheless, both of these economists stress that caution must be taken in interpreting relative wages at any one point in time since the marginal productivity assumption may be violated in particular circumstances.

The debate surrounding the marginal assumption has broadened in recent years with the many attacks on the basic idea that education enhances productivity. Wolff (1977:260) refers to Gintis's argument that education is a mechanism of personality transformation which creates reasonably docile and obedient workers. He also points to the argument by Spence that education serves as a signalling device to employers in a market of imperfect information. Finally, Wolff advances his own hypothesis that schooling performs a sifting function which sorts people into different occupational slots.

Layard and Psacharopoulos (1974:985) point out that the most severe attack on the idea that education enhances productivity has arisen in recent years with the so-called "screening hypothesis." Broadly stated, this hypothesis claims that earnings differentials associated with education do not reflect increased productivity, but rather the employer's use of education to identify pre-existing differences in talents. Taubman and Wales (1974:153), proponents of this hypothesis, claim that employers use education as a screening device to identify those persons who have the potential to be more productive. Arrow (1973), Chiswick (1973) and Thurow (1974) suggest that educational institutions are simply a filtering device. These authors contend that the actual training functions of such institutions is minimal because skills are largely developed on the job and also because students possess innate personality traits and cognitive abilities.

Much controversy surrounds the screening hypothesis. Taubman and Wales (1975:97) have tentatively concluded that up to one half of earnings differentials by level of education is due to screening. This conclusion has been seriously questioned by others given the complexity involved in separating the effects of education as a screening device from education's productivity augmenting function as explained by human capital theory (Sahota, 1978:18; Layard and Psacharopoulos, 1974:995).

However, Blaug (1976:847) argues that the screening hypothesis is not incompatible with human capital theory. Welch (1975:65) puts forth the basic rationale in this regard:

> It seems noteworthy that the fundamental notion of human capital, of foregoing current income on the prospect of increased future earnings, assumes only that the schooling - income association is not spurious. As such, it is fully consistent with the screening view that schools primarily identify pre-existent skills and the view that market skills are produced in school.

A basic question regarding marginal productivity is whether the assumption must be made at all in rate of return calculations. Psacharopoulos (1973a:26) maintains that for social rate of return calculations to have any meaning for public investment decisions, the assumption must be made that persons are paid according to their marginal productivity. But this does not rule out the utility of rate of return calculations where the assumption is not made. Blaug (1965:238) and Bowman (1969:651) contend that rate of return analyses can serve the alternative purpose of providing a test of the market situation. Such analyses can identify areas where monopolistic restrictions and non-monetary preferences in jobs appear to exist. The results of such analyses can provide a signal as to the need to work towards the reform of the salary determination process in a particular sector.

Discount rate. Woodhall (1970:21) states that a cost-benefit calculation requires age-earnings differentials to be combined into a single figure representing the total monetary benefit of education over a lifetime. This figure can then be compared with the cost of education. While the addition of each year's earnings differential would appear to be the simplest method, such a method is inadequate. Woodhall (1970:21) puts forth the basic argument in this respect:

> The costs of an investment must be incurred in the present in order to obtain income in the future, and the expectation of receiving money in the future is worth less, in the present, than a corresponding amount actually received in the present. This is not simply a case of 'a bird in the hand is worth two in the bush', but reflects the fact that a sum of money received today can be invested at a positive rate of interest, so that it will increase steadily and in time be worth very much more than its present value.

Cost-benefit calculations, therefore, require the discounting of future flows of income. The basic purpose of these calculations is to compare the present value of expected future benefits with the costs of the investment which must be incurred in the present.

While discounted cash flow methods are technically simple, much controversy surrounds the choice of the discount rate. Baumol (1970:273) points out that the discount rate chosen may make the difference between acceptance or rejection of a particular project. Yet, he notes that:

> Despite the critical nature of this parameter, in some calculations it is assigned a value almost cavalierly, with little attempt to show that the selected figure is not chosen arbitrarily and capriciously.

Several guidelines are provided in the literature for the selection of the discount rate. Vaizey (1972:71) maintains that the discount rate should represent the rate of return on the next best investment alternative. The identification of this alternative, however, poses problems. Stager (1968:61) identifies three rates which have received discussion in the literature: (1) the long-term government bond rates, (2) the rate of return on private business investment, and (3) the social and private rate of time preference. Psacharopoulos (1973a:80) observes that the usual practice has been to compare the private rate of return on investment in education with the "real" borrowing rate in the economy and to compare the social rate of return to the before-tax yield on private corporate capital.

Much controversy exists as to whether rates of return in the private sector are the appropriate guideline for public projects. Baumol (1970: 274) argues that the correct discount rate for the evaluation of a government project is the percentage rate of return that the resources utilized would otherwise provide in the private sector. However, Holmes (1974:24) contests the idea that the yield on private investment should be the guideline for public investment. He claims that the socially optimal rate for education cannot be expected to be as high as for private sector investment. A major reason in this respect is that while the external benefits of education are important from a social standpoint, these are not reflected in the usual measurement of monetary benefits.

The arguments advanced by Holmes provides a rationale for using differing discount rates for the estimation/evaluation of private versus social monetary returns to education. In addition, the rate of time preference is different for the individual as compared to society. The concept of time preference refers to the preference for current as opposed to future consumption. (The more current consumption is favoured, the higher is the rate of time preference.) Stager (1968:62) observes that the private rate of time preference is generally thought to be higher than the social rate. Holmes (1974:25) provides the following explanation in this regard:

> Although pure time preference would influence the individual to favour current to future consumption thereby reducing savings and increasing the rate of return on private investment, this factor is much less powerful from the point of view of a society concerned with the interests of succeeding as well as present generations.

Rossi, Freeman and Wright (1979:271) indicate that because of the sensitivity of cost-benefit calculations to the discount rate, the usual practice is to carry out the calculations using several rates. Accordingly, three discount rates, 5, 10 and 15 per cent, were used in the present study.

The choice of the three specific discount rates in this study was made using the various guidelines in the literature. The 5 per cent rate was justified from the social perspective given the arguments noted previously that the social rate should be less than the rate on private investment. Stager (1968:62) notes that the social rate of time preference has been estimated between 5 and 6 per cent. Holmes (1974:25) contends that the appropriate "real" discount rate for public investment in education is 4 per cent (where the effects of inflation and secular growth are excluded). The 10 per cent rate reflected the rate on long term government loans during the period under review (see Appendix B.4 for the borrowing rates for the Government of Saskatchewan). Finally, a 15 per cent rate was used as there appeared to be instances of rates in this vicinity on private sector investment.

Although the three discount rates were used in the analysis, the discussion of findings in this study focuses on the results using the 5 and 10 per cent rates. Moreover, in reaching conclusions the 5 per cent rate was regarded as the minimum acceptable rate for social monetary returns and the 10 per cent was regarded as the minimum acceptable rate for private monetary returns.

Applicability of Cost-Benefit Analysis

The analytical framework provided by the theory of human capital focuses attention on the relationship between the costs and benefits of education. The applicability of cost-benefit analysis in education, however, is a subject of much debate.

Much of the debate is concerned with the limitations of cost-benefit analysis in dealing with benefits. As noted earlier in this chapter, most applications of cost-benefit analysis to date, including the present study, have been delimited to the direct monetary benefits of education. Because of this, the applicability of cost-benefit analysis is largely dependent upon the nature of the study being conducted. There are two features of the present study which enhance the applicability of cost-benefit analysis. First, the study examined non-university post-secondary programs of a technical nature which provide specific market skills relative to particular occupations. Carroll and Ihnen (1967:862) contend that a larger fraction of the returns to such programs is measurable through earnings differentials than for university programs. Second, the focus on a specific cluster of training, health personnel training, strengthens the case for cost-benefit analysis. Woodhall (1972:254) argues that the exclusion of external benefits is not crucial so long as there are no substantial differences in the external benefits among the different types of programs being compared. Even Vaizey (1972:6), a leading opponent of cost-benefit analysis in education, concedes that such analysis is applicable within particular sectors when the purpose is to compare and contrast activities which closely resemble each other.

Data limitations have also emerged as a major concern relative to cost-benefit analysis. Rothenberg (1975:88) states:

> Regardless of its methodological claims, the practical usefulness will be most decisively at the mercy of available data. Very serious inadequacy of relevant data exists in almost every area for which cost-benefit analyses have been undertaken.

Nay, Scanlon and Whaley (1973:25) conclude their review of cost-benefit studies of manpower training by pointing to the need for improved data and for more detailed analyses within program areas. There are two aspects of the present study which enhanced the applicability of cost-benefit analysis in this regard. Rather than relying on aggregated cost data as many previous studies have done, a program cost analysis was conducted to obtain educational institution costs. Also, instead of relying on assumptions about the earnings profiles of females, an analysis of the real-world labour force activity patterns of females was conducted to obtain the earnings data.

In addition to the particular features of the present study which enhance the applicability of cost-benefit analysis, there are several general arguments supporting such an analysis. Prest and Turvey (1965:730) put forth four arguments in their classic review of the subject. First, they maintain that cost-benefit analysis "forces those responsible to quantify costs and benefits as far as possible rather than rest content with vague qualitative judgements or personal hunches."

Second, they recognize that cost-benefit analysis has the "valuable by-product of causing questions to be asked which would otherwise not have been raised." Third, they contend that "even if cost-benefit analysis cannot give the right answers, it can sometime play the purely negative role of screening projects and rejecting those answers which are obviously less promising." Finally, Prest and Turvey claim that "the case for using cost-benefit analysis is strengthened, not weakened, if its limitations are openly recognized and indeed emphasized."

THE THEORY OF HUMAN CAPITAL AND EDUCATIONAL PLANNING

The theory of human capital provides the theoretical basis for the rate of return approach to educational planning. This approach has emerged as one of the three major approaches to educational planning (Blaug, 1967:262; Rogers and Ruchlin, 1971:224). Some discussion of the other two approaches, the social demand and manpower requirement approaches, is necessary to assess the utility of the rate of return approach.

The demand-for-education approach, or the social demand approach as it is frequently called, attempts to provide school places for everyone who wants to go to school. This may appear simple, but as Rogers and Ruchlin (1971:224) point out, numerous problems arise in estimating demand. In particular, difficulties arise at the post-compulsory levels of education where a wide variety of factors influence an individual's decision to further his/her education. (One such factor is the monetary pay-off which provides some reason to calculate rates of return.)

Cohn (1972:355) observes that one of the limitations of the social demand approach is that it disregards the relationship between costs and benefits: more specifically, he argues that:

> Even if all nations could "afford" to pay for the type of educational programs suggested by the social demand approach, it is not necessarily true that it would be wise to do so. Even if it is granted that educational returns are likely to be high relative to their cost, other worthwhile public projects--such as health activities, conservation, urban renewal, crime control, etc.--are competing for the available resources. Thus, an expansion of the educational system to meet the private demand may not be in the best interest of society.

Rogers and Ruchlin (1971:225) contend that the social demand approach has two major difficulties. The approach does not provide a set of priorities to guide resource allocation when there is insufficient resources to meet all the demands. Also, the determination of the actual demand is difficult when education is subsidized because the public is not directly faced with the true price of education. This has the effect of increasing the level of demand.

Since the social demand approach is more or less a projection exercise in which the planner has to make few choices, the major controversies in educational planning have centered around the manpower requirements and rate of return approaches. Between the two, as Psacharopoulos (1973b:609) states, "the manpower approach has won the race in terms of popularity as being more intuitive and less data demanding." Similarly, Blaug (1970:137) remarks that the manpower requirements approach represents the leading method throughout the world for integrating educational and economic planning.

The basic goal of the manpower requirements approach, according to Rogers and Ruchlin (1971:226), is to determine how many people possessing each skill level will be needed at some future date. The educational system is then geared to produce the required number of individuals with the necessary skills. Blaug (1970:141) remarks that the fundamental axiom of the manpower requirements approach is that highly qualified manpower constitutes a bottleneck to economic growth, that is, any shortfall of such manpower will affect the productive process and thereby impede growth. A discussion of the manpower requirements is particularly relevant to the present study since much of the educational planning in Canada with respect to health personnel has relied heavily on this approach.

Despite its popularity, the manpower requirements approach has been seriously questioned. Two criticisms of the manpower requirements approach are particularly noteworthy. One criticism, as Anderson and Bowman (1967:368) observe, is that the approach pays no attention to the costs of human resource formation or to the relationship between these costs and the benefits received. Instead, the manpower requirements approach views the important goal as being the production of a certain number of people with particular skills at any cost (Psacharopoulos, 1973b:614). Blaug (1965:259) is very critical of the approach on this point when he states that "by its failure to pay any attention to money costs and earnings, manpower planning stands condemned as a brand of technological determinism."

The other major criticism of the manpower requirements approach is that it ignores substitution possibilities between different categories of manpower (Anderson and Bowman, 1967:366). However, Moser (1973:ix) and Psacharopoulos (1973b:621) point out that there is a high degree of substitution between different types of educated labour in the real world. This leads Psacharopoulos (1973b:610) to assert "that the popular manpower requirements approach is based on shaky theoretical foundations and that in educational planning relatively more weight should be given to the cost-benefit approach."

The rate of return approach, examines the relationship between monetary costs and monetary benefits. The guiding principle of this approach, according to Rogers and Ruchlin (1971:228), is that programs giving the highest returns should be increased relative to other programs (assuming that the programs with the highest returns yield returns which are higher than on alternative investments in the economy). Psacharopoulos (1973b:623) argues that a rate of return approach is generally more justified than the manpower requirements approach in view of the evidence on substitution possibilities.

However, caution must be expressed regarding the use of the rate of return approach in educational planning. Given the restricted definition of costs and benefits, rate of return analyses need to be supplemented with other indicators in educational planning. Accordingly, Bowman (1969:652) argues "that conventional benefit-cost analysis is an indispensable but insufficient tool for educational planning."

The emerging thrust in educational planning appears to lie in a synthesis of the various approaches. Blaug (1967:278) states that:

> None of the three conflicting approaches to educational planning has any logical priority over the others. Faced with an uncertain future, educational planning must diversify its portfolio of methods and techniques.

Blaug (1967:286) suggests a synthesis of the three approaches whereby manpower forecasts are made initially on a short-term basis. Concurrently social demand projections are made. Finally, the rate of return approach is used to examine relationship between earnings and education. The importance of this latter step is summarized by Blaug when he states:

> By making such calculations on a year-to-year basis we keep a continual check on labour markets for highly qualified manpower and gradually develop insights into the ways in which education interacts with economic growth.

The growing pressures for increased efficiency in public expenditures provides added support for the use of rate of return analysis in educational planning. Haveman (1971:7) observes that a basic theme running throughout public expenditure analysis is economic efficiency. Moreover, the need to improve the efficiency of educational systems has been emphasized by the Economic Council of Canada (1971:222). Holmes (1974:29) comments on the Canadian situation as follows:

> None of this should be taken to mean that economic considerations are the only, or even the most important factors in the evaluation of educational programs. Priorities in the expenditure of public funds may very properly be assigned primarily on non-economic grounds, but economic considerations remain important, particularly now that the financing of our educational system takes such a large share of the taxpayers' dollar.

EMPIRICAL RESULTS AND RESEARCH NEEDS

Since the emergence of the theory of human capital in the 1960's, numerous studies have estimated rates of return on educational investment. Blaug (1976:840) observes that "calculations of the rates of return to investment in formal schooling have proved to be the bread-and-butter of the human capital research program . . . ."

This section provides a selected review of the empirical results and of research needs identified in the literature.

Empirical Results

In his review of research Douglass (1970:365-369) identifies three periods of scholarly activity, each differing in terms of the questions being asked and in the sophistication of the research design. During the earliest period, 1956 to 1965, private rates of return in the vicinity of 12 to 15 per cent were found for higher education in the United States. Douglass contends that these results tended to overstate the effects of education on earnings because of weaknesses in research design and data sources.

In the middle period, 1966 to 1972, the scope of interest widened, data sources improved, and the first disaggregations by race, sex and region were derived. Douglass notes that private rates of return to four years of college in the United States ranged between 9.6 per cent (Hanoch, 1965) to 13.6 per cent (Hines, Tweeten and Redfern, 1970). The general conclusion during this period was that education was an attractive investment. Hines, Tweeten and Redfern (1970:318) suggested that schooling was an attractive investment across all schooling levels and for all race-sex groups.

Douglass (1977:368-371) notes that the most recent empirical work, 1973 to the present, has broadened further in terms of research interests. Some of the major thrusts include studies aimed at (1) sorting out the influence of education from other variables that affect earnings, (2) ascertaining the relationship of human capital formation through schooling with human capital formation in pre-school and post-school years, and (3) further disaggregation by occupational group. The present study fits into this latter research thrust.

In his review of 53 rate of return studies in 32 countries, Psacharopoulos (1973a:61-73) makes several important observations. He notes that rates of return tend to decline as the level of education rises. Generally, the highest rates of return are to primary education and the lowest are to graduate level university education. Also, private rates of return are generally higher than social rates of return. This is not surprising given the extent of public subsidization of education in most countries. Furthermore, rates of return tend to be higher for males than for females. Finally, a wide range in rates of returns exists among occupations.

The results of six studies are summarized in Table 1. All of these studies are relevant to the present study in that they provide rates of return on post-secondary education. However, none of these studies provides a direct comparison for the present study. These studies dealt either with broad categories of post-secondary education or with different occupational groups than those contained in the present study. The literature review revealed very few Canadian studies. Moreover, only Stager's study appears to have examined non-university post-secondary programs. But even Stager's study does not provide a direct comparison since nursing was the only identified health personnel training and these programs were in hospital based schools. (Students in those schools received income in exchange for services rendered as part of their training.) The overall conclusion from the review of empirical work is that there is a dearth of research in Canada on rates of return for non-university post-secondary education and for non-university health personnel training in particular. Therefore, the

Table 1

Rates of Return from Selected Studies

Country Researcher Year of Study	Data Base	Sex	Type of Education	Findings Social ROR	 Private ROR
United States					
1. Hines, Tweeten and Redfern (1970)[a]	1959 National	Males	Post-Secondary (2-3 yrs.)	8.3%	12.1%
		"	Post-Secondary (4 yrs.)	9.7	13.6
		Females	Post-Secondary (2-3 yrs.)	2.3	6.9
		"	Post-Secondary (4 yrs.)	4.2	9.9
2. Raymond & Sesnowitz[b] (1975)	1970 National	Males	Post-Secondary (1-2 yrs.)	13.3	14.6
		"	Post-Secondary (3 yrs.)	10.6	11.9
		"	Post-Secondary (4 yrs.)	14.3	16.7
Canada					
3. Podoluk (1965)	1961 National	Males	Post-Secondary (4 yrs.)	14.0	19.7
4. Stager (1968)[c]	1961 Ontario	Males	Institutes of Technology	7.6	9.4
		Females	Nursing Schools	3.3	11.0
5. Systems Research Group (1971)[d]		Females	Nursing	1.8	11.5
6. Holmes (1974)[e]	1967 National	Males	Post-Secondary (4 yrs.)	8.0	N/A

Note. N/A denotes not available.

[a] No secular growth or alpha coefficient adjustment.

[b] A 3.5 per cent secular growth rate adjustment and an alpha coefficient of 75 per cent.

[c] No secular growth rate adjustment and an alpha coefficient of 67 per cent.

[d] A 2.7 per cent secular growth rate adjustment and an alpha coefficient of 80 per cent.

[e] A 2.5 per cent secular growth rate adjustment and an alpha coefficient of 100 per cent.

results in Table 1 provide only a general context for the interpretation of rates of return in the present study. Reference to this table is made in Chapter 9 in the discussion of conclusions.

Research Needs

A wide variety of research needs are identified in the literature. The present study focused on four research needs as discussed below.

Returns by occupations and fields of study. Psacharopoulos (1975:176) observes that much of what we know about the returns to education is based on highly aggregated studies particularly by level of education. The evidence, he suggests, is very scanty on the returns to education within levels disaggregated by subject. As an example, he singles out returns by fields of study in higher education as an area where gaps exist.

In his review of research needs, Nollen (1975:56) identifies the need for further disaggregated studies by type of student and by type of formal education. Also, Nollen argues that "in a time of increasing concern over the vocational relevance of education, more detailed results are needed on the rate of return to occupations." This, he suggests, is "important for manpower policy since it begins to get at the returns to particular skills." Commenting on the Canadian situation, Holmes (1974: 29) suggests that future studies should seek greater detail by educational level and that additional information on technical education is required.

Disaggregated approaches such as those by occupation or field of study are important from a theoretical standpoint in that they serve to illustrate more clearly the relationship between education and earnings. Eckaus (1973:51) suggests that the influences of education on earnings are complex and "cannot be caught by calculations for all members of the labour force at each level of education." Eckaus (1973:53) goes on to argue that there is not only one rate of return at each level, but rather there are many. He also observes:

> This idea that there are many different markets for different kinds and levels of education has not previously penetrated deeply into the rate-of-return approach to the economics of education. In education, as in other fields, however, policy-making is fortunately ahead of formal economic analysis. When the need for a redress in demand or supply in a particular field has appeared particularly pressing, it has often been the object of a particular policy. Unfortunately, the data and analysis necessary for satisfactory policy-making remains incomplete.

The present study should make a contribution to the empirical literature as it focused on 12 non-university health personnel training programs. In that these training programs are largely tailored to specific occupations, the study also serves to provide rates of return by occupation.

Improved cost data. The need for improved cost data has been identified in the literature. Hansen and Weisbrod (1969:80) insist that more precise and current estimates of capital and instructional costs are essential in gaining a better understanding of the total costs of education. Douglass (1977:377) maintains that the inadequacy of data concerning educational costs is one of underlying problems with social rates of return. This research need has been identified because several rate of return studies have used cost data obtained from highly aggregated statistics.

Schultz (1967:300) argues that the work to measure costs has fallen behind the estimation of earnings, but both are vital to rate of return studies. He contends that researchers have ignored many factors that influence the cost of education. More specifically, Schultz states:

> I am not so much troubled by our national (aggregate) costs estimates as I am about the way these national estimates are then allocated to various subgroups by region and race without taking account either of the large differences in cost arising from the differences in the regional mix of low-cost community colleges and high-cost private colleges or of the differences in earnings of students attending school, between both regions and types of communities in the same region.

The present study, included a program cost analysis as part of the research design. The cost analysis was a deliberate attempt to obtain better cost data than has been relied on in many previous studies.

Monitor rates of return over time. Nollen (1975:56) states that there is a pressing need to continue to monitor rates of return in the 1970's. He points to the decline in the "real" annual income of college graduates in the 1970's and to the ever-rising tuition costs as having the potential effect of lowering rates of return in the future.

Much debate currently exists as to the trends in rates of return. Freeman and Hollomon (1975:25) contend that there has already been a substantial decline in the United States. They cite one set of estimates which show the rate of return on college education to have fallen from 12 to 8 per cent in the period between 1969 and 1974. However, Witmer (1970:60) challenges these findings by arguing that the rate of return has not yet declined. Although Witmer does concede that rates may decline over the next 25 years, he claims they will recover again by the year 2000.

Holmes (1974:29) maintains that "additional and continuing work" is needed on rates of return in Canada. While much the same debate can be expected in Canada, relatively little data exists on the rate of return on educational investment in this country. Moreover, he argues that:

> Regular measurement of the economic returns to education is important, not only because a large amount of public money is involved, but also because the returns are changing as rapidly as changes in the amount and kind of education acquired by the Canadian working force.

The present study should serve to provide baseline data as it presents returns on investment for occupational training areas not previously examined in Canada. The choice of a three year time frame should serve to strengthen the base since it guards against establishing baseline data from a single atypical year.

Returns to females. Rate of return studies have largely been confined to males. Schultz (1970:303) remarks that if "one were to judge from the work being done, the conclusion would be that human capital is the unique property of the male population." Furthermore, he states:

> If it is true that investment in human beings is only for males, we would do well to drop the term "human capital" and replace it with "male capital." It would serve notice that human capital is sex specific! Despite all of the schooling of females and other expenditures on them, they appear to be of no account in the accounting of human capital. If females are capital-free, in view of all that is spent on them, we are in real trouble analytically, unless we can show that it is purely for current consumption.

Woodhall (1973:9) adds support to Schultz's observation when she remarks:

> The literature on investment in education gives the impression that women's education is either a form of consumption, or an unprofitable form of investment given the likelihood that a woman may leave the labour force after marriage, or may work short hours in a low-paying occupation.

Several comments about the returns to females were included in Becker's classic study (1964) of human capital even though women were excluded from the study. Becker (1975:178) contended that while income differentials are much smaller for females as compared to male college graduates, the rate of return may not be lower. As an explanation he noted "direct costs are somewhat lower and opportunity costs are much lower for women." Nevertheless, Becker adopted the attitude taken by many economists to date when he stated "women spend less time in the labour force than men and, therefore, have less incentive to invest in market skills."

Given the rising female labour force participation rates, traditional notions about the returns to female education are becoming increasingly questionable. Moreover, Woodhall (1973:11) cites empirical results from around the world which suggest that education may indeed be a good investment for females. These studies demonstrate that an important factor, apart from lower foregone earnings during training, is the tendency for female labour force participation rates to increase with higher levels of education. Leibowitz (1975:172) notes that the same association has been found in studies in the United States. Woodhall (1973:18) comments on the association between education level and female labour force participation rates as follows:

> There is evidence from many countries that the more highly educated a woman, the more likely she is to work, and in particular, to return to work after marriage or child rearing. . . .
> . . . .
> Education influences a woman's willingness to work by increasing her earnings capacity; and by increasing access to more enjoyable jobs.

The present study provides an examination of the returns to females in non-university health personnel training programs. The analysis of earnings was based on the most recent labour force participation rates for females in Canada.

SUMMARY OF CHAPTER 2

This chapter has presented the analytical framework for the study and a review of related literature. The theory of human capital provided the analytical framework for the study. The essence of this theory is that persons use resources to improve themselves for the sake of future returns.

The analytical framework provided by the theory of human capital focuses attention on the costs of education, and on the increments to productivity that result from education. From the individual or private standpoint the costs include the amount of foregone earnings and direct educational costs. Costs from the social standpoint are much higher as public subsidies to education must be included. Increments to productivity are estimated by focusing on earnings differentials associated with education. Such an analysis provides a restricted view of benefits as neither the psychic benefits to the individual nor the external benefits are considered. Nevertheless, the analysis provides a measure of at least one of the multiple effects of education.

The theory of human capital provides theoretical basis for the rate of return approach to educational planning. While the social demand and, particularly, the manpower requirements approach are more popular approaches, only the rate of return approach provides an analysis of the relationship between the monetary costs and benefits of education The emerging thrust is for a synthesis of the three approaches in educational planning.

Since the emergence of the theory of human capital in the 1960's, numerous studies have examined rates of return on educational investment. The emphasis for research has changed from the highly aggregated studies of the 1960's to more complex and disaggregated studies in the 1970's. The present study focused on four research needs identified in the literature, namely, the need to: (1) estimate returns by occupational group and field of study, (2) obtain improved cost data for rate of return studies, (3) monitor rates of return over time, and (4) estimate the returns to educational investment for females.

Chapter 3

THE METHODOLOGY FOR ESTIMATING COSTS

The analytical framework provided by the theory of human capital focuses attention on the relationship between the costs of training, or the magnitude of investment, and the earnings differentials associated with training. This chapter describes the costing methodology used in the study. The following chapter presents the methodology for the estimation of earnings differentials and for the measurement of monetary returns on investment.

OVERVIEW OF THE COSTING METHODOLOGY

The Costing Approach

At the outset, there is a need to recognize that numerous approaches to costing exist. Moreover, the National Center for Higher Education Management Systems (NCHEMS) (1977:4.5,1) states:

> The determination of cost information is a process of approximation, and requires the individual performing cost determinations to exercise judgement based on circumstances relevant to the purposes for which cost information is collected. Different cost results occur even when equally valid alternative approaches are used.

Since the total resource costs are relevant in the estimation of social costs, a full cost approach was appropriate for this study. NCHEMS (1977: 4-8) defines full costing as "the accumulation of all direct and indirect costs attributed to units of service." Such an approach enables the user not only to examine the total costs, but also to analyze the direct and indirect components of this total.

An important feature of cost analysis is the identification of costs in terms of particular units of service provided. NCHEMS (1977:3) observes that the primary difference between cost accounting and financial accounting is that "the former involves obtaining unit cost of information and the latter involves obtaining costs primarily by organizational unit or function." In the present study costs were determined on both per student and per graduate bases. The rationale for including a per graduate cost, as noted in the review of literature, is particularly relevant in the case of the training programs examined in this study. The health personnel training programs are largely tailored for particular occupations and graduation from the training programs is necessary for entry to the respective occupations.

Although this study was concerned with social costs and their distribution in terms of cost components, costs were also determined from the standpoint of the individual. In estimating private costs, three types of students were considered; namely, self-supporting students, bursary recipients, and allowance recipients.

Particular Features of the Costing Approach

Time period. While the cost data and/or appropriate indexes for each cost component were available on an annual basis, the exact reporting year for the data differed in some cases. Rather than adjust each set of data, the 1974, 1975 and 1976 calendar years were chosen as the guidelines for the collection of data. The reporting year most comparable to those calendar years was then accepted in the case of each data source.

The training years involved were 1974-75, 1975-76 and 1976-77. The choice of the first calendar year (e.g. 1974 in the case of 1974-75) was made largely because educational institution costs, as recorded on the basis of the government's fiscal year, more accurately reflected the first rather than the second calendar year. The government's fiscal year runs from April 1 to March 31.

The intent of the study was to provide costs and earnings for each of the three years. Since no standardization was used, differences in costs and earnings between the years include the effects of inflation. This did not pose a problem since the costs and earnings for each year reflected the same dollar values and the main objective of the study was to examine the relationship between these variables at three points in time.

Enrolment basis. Eisner (1978: 34-37) observes that "the calculation of student enrolments, while seeming to be a simple procedure, is a most difficult and complex task." Moreover, as Eisner goes on to point out, the manner in which students are counted can dramatically affect the values in the "bottom line" of cost calculations. Because of the critical nature of the enrolment counting procedures, he argues that the adoption of a consistent methodology is important, particularly in studies where different programs or schools are to be compared.

The enrolment statistics used in the present study reflected the initial or starting enrolment in programs. These enrolments are presented in Appendix D, Tables 46 and 47.

Costing two year programs. The costs of two year programs were determined by obtaining the total program costs in a single year. This total included the costs for both year one and year two of the program. An alternative approach would have been to follow each group of students and thereby obtain year one costs from one training year and year two costs from the succeeding training year. This approach was not used because cost data by year of program were not available for all two year programs. Also, the approach would have introduced inflationary cost increases.

Number of graduates. For one year programs, the number of graduates from each program in each year was readily evident. However, in the case of the two year programs, difficulties arose.

The costing of two year programs was done using the combined year one and year two enrolment in each training year. Under such an approach, the use of the actual number of graduates in a particular training year would have been misleading as only year two students could possibly graduate. To ensure a meaningful relationship between per student and per graduate costs, the number of graduates had to correspond to the enrolment base. Consequently, an enrolment flow approach was used to derive the appropriate number of graduates in each year. The appropriate number of graduates was derived by taking the actual number of graduates from the year two enrolment in a given training year and then adding to that the number of first year students who eventually went on to graduate one year hence. In doing this, however, the graduate and enrolment figures were matched only in terms of the time dimension, not on an individual basis. Therefore, the actual number of graduates in 1976 corresponded to first year enrolment in 1974-75 because that is when the graduates would have normally entered the program. The number of graduates and the corresponding initial enrolment in the two year programs is shown in Appendix D, Table 46.

Cost components. The five cost components included in this study were (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) the imputed costs of interest on physical plant and of property tax exemptions. Each of these cost components is described separately in the following sections of this chapter.

EDUCATIONAL INSTITUTION COSTS

The application of a full costing approach in determining educational institution costs was made using NCHEMS's Procedures for Determining Historical Full Costs (1977) as a guide. These procedures were designed to promote standard definitions and procedures for collecting cost information in higher education.

While the training years for most programs under review ran from September to late June, cost data were available only on the basis of the government's fiscal year, namely April 1 to March 31. In keeping with the budgeting practices for the programs, the 1974-75 fiscal year data were used for the 1974-75 training year.

As noted earlier, the Kelsey and Wascana Institutes are provincial government institutions administered by the Department of Continuing Education. However, other government departments also have some specific responsiblities; the most important being the Department of Government Services which has responsibility for the physical plant.

Educational institution costs were defined as the costs of operating the health personnel training programs. These consisted of four sub-components: (1) direct instructional costs, (2) indirect instructional costs at the Institutes, (3) physical plant costs, and (4) central department costs.

Direct Instructional Costs

Definition. Direct instructional costs comprised specific objects of expenditure which were incurred by each training program. Seven of the 12 programs were identifiable cost centers within the government's accounting system (in the terminology of the accounting system, these programs were separate sub-subvotes). The other five programs were those offered at the health sciences division of Wascana Institute where the division itself was the sub-subvote or cost center. Therefore, a supplementary set of procedures was necessary to break down the division expenditures on a program basis.

The specific objects of expenditure constituting direct instructional costs were (1) salaries and wages, (2) contractual services (e.g. staff travel and sustenance, publicity, and professional fees), (3) materials and supplies, and (4) other miscellaneous obligations such as sales tax on supplies. These objects were readily identifiable in codes 1 to 4 of the government's accounting system.

An annual use charge on program specific equipment was subsumed in direct instructional cost. Following the guideline provided by NCHEMS (1977:2.45), the charge was calculated assuming the life of the equipment was 10 years. In the depreciation schedules maintained by the institutes, a distinction is made between "capital" and "non-capital" equipment; the former being over $25 and the latter being less than that amount. Therefore, only the "capital" component was considered in deriving the annual use charge on equipment. The items below $25 were counted in the year of purchase at their total value. (See Appendix J, Table 61 for annual use charges for program specific equipment.) While the annual use charge on program specific equipment could have been treated as a separate cost sub-component, this was not warranted given its relatively low impact on educational institution costs.

The one other item included within the definition of direct instructional cost was the employer contribution for employee fringe benefit plans; namely, Canada Pension Plan, Group Life Insurance, Unemployment Insurance and Superannuation. Again, this is an item which NCHEMS (1977:2.16) has identified as being essential in program costing. The inclusion of this item posed problems in this study as several government agencies, other than the Department of Continuing Education, actually pay the employer contribution for all government employees, including Institute staff. The Department of Finance pays the contribution for Canada Pension and Unemployment Insurance. The employer contribution for Group Life Insurance and Superannuation are covered by the Public Service Commission and the Public Service Superannuation Board, respectively. Since the employer contributions are paid for all government employees, it was not possible to single out Institute staff. Therefore, an estimate for employer contributions was made using the practice followed in provincial claims to the federal government under the Adult Occupational Training Act where total salary and wages were increased by 8.5 per cent.

Sources of data. The three sources of data used in estimating direct instructional costs were (1) the Detail Expenditure Estimates of the Department of Continuing Education, (2) the claims under the Adult Occupational Training Act, and (3) the capital equipment inventories maintained by the Institutes.

The Detail Expenditure Estimates of the Department of Continuing Education provided both estimates for the coming year and the actual expenditure for past years. Only the actual expenditure data were used in this study. The source provided a breakdown of expenditure by code on a sub-subvote level.

Claims prepared under the Adult Occupational Training Act were used in the case of the seven one year programs. While these claims used the same expenditure data as in the source noted above, the 8.5 per cent upwards adjustment for fringe benefits was already included. These claims were available for only the one year programs because only these programs were eligible for support under the Adult Occupational Training Act.

The capital equipment inventories maintained by the Institutes were used to derive the annual use charge on equipment.

Health sciences division, Wascana. A supplementary set of procedures was necessary to estimate program costs at this division because the division, not specific programs, was the established cost center. This arrangement was due to the existence of a core curriculum for several programs.

The division operated five of the programs included in this study: diploma nursing, psychiatric nursing, health record administrator, nursing assistant, and operating room nursing.

A closer investigation of the instructional programs at the division revealed the following:

(1) A common core year was used primarily for first year diploma nursing, first year psychiatric nursing, and the nursing assistant program.

(2) Year one of the health record administrator program had only a limited association with the core year in that two subject areas (social sciences and biologial sciences) were shared.

(3) The second year of each two year program operated independently in terms of instructional staffing.

(4) The operating room nursing program was not involved in the sharing of instructional staff with other programs.

(5) The staffing configuration for the division had remained virtually unchanged during the period covered by this study.

(6) Eight of the 18 course credit hours provided in year two of the health record administrator program were provided by the University of Regina.

Therefore, four steps were necessary to estimate program costs for programs in the health sciences division.

First, the salary costs of the entire division for 1976-77 were distributed among five instructional areas. The percentage breakdown was as follows:

Core Year	52.39%
Diploma nursing, year two	23.91%
Psychiatric nursing, year two	14.47%
Health record technology	4.75%
Operating room nursing and techniques	4.48%

This distribution was derived using the actual assignment of teaching and/or supervisory duties for individuals. In effect, the teaching and/or supervisory load for the entire staff was reviewed. The salary for each individual was then attributed to one of the above instructional areas or prorated among areas. (Of the 83 staff members, however, only 17 had responsibilities in more than one of the above instructional areas.) In view of the stability in the staffing configuration, the same percentage breakdown of salary costs was also used for the 1974-75 and 1975-76 training years.

Second, the other direct instructional costs (contractual services, materials and supplies, miscellaneous obligations, non-capital equipment, and the annual use charge on equipment) were allocated to the five instructional areas on the basis of student training day proportions. While the accuracy of this approach may be questioned since it assumes an equivalent cost per student, the impact of any distortion on the resulting program costs would be minimal. The non-salary costs represented a relatively small part of direct instructional costs; in 1976-77, these costs accounted for 12 per cent of direct instructional costs.

With the completion of the above, the direct instructional costs for both the health record administrator and the operating room nursing program were derivable. In the case of the health record administrator program, the direct instructional costs by themselves were misleading as the University of Regina provided two courses for these students. However, the costs for these courses were included in the total educational institution costs as will be discussed later. Also, beginning in 1976-77, a health record technician option was offered. Therefore, for that year it was necessary to prorate direct instructional costs between the health administrator year one program and the health record technician option. The respective proportions of total student training days were used to prorate costs.

In the case of the operating room nursing program, direct instructional costs were obtained by taking one half of the direct instructional costs for the operating room nursing and techniques instructional area. Only one half of the cost was used as two programs were operated under the operating room nursing and techniques instructional area (operating room nursing and operating room technician). Since each program was identical in length (one semester) and operated with the same staff complement, the cost of operating room nursing alone was one half the total direct instructional costs.

Third, the total direct instructional costs for the core year were distributed among diploma nursing year one, psychiatric nursing year one and the nursing assistant program. This distribution was made using each program's share of total student training days. The implicit assumption of an equivalent cost per student was realistic given the fact that all students are in a common year. With the completion of this task, the direct instructional costs for the nursing assistant program were derivable.

Fourth, the direct instructional costs of diploma nursing and psychiatric nursing were derived by adding together the year one and year two costs.

Dental division, Wascana. While both the dental nursing and dental assistant programs were identifiable cost centers at this division, a closer investigation revealed that part of the total salary costs charged to the dental nursing program were attributable to the dental assistant programs (approximately 4 per cent in 1975-76 and 7.7 per cent in 1976-77). Accordingly, these adjustments were made in the estimation of direct instructional costs for the two programs. Also, the annual use charge on equipment had to be shared. Since the dental nursing program was established first, most of the equipment in the division was purchased for that program. The dental assistant program, established in 1975, uses much of this equipment. The proration of the annual use charge was made using each program's share of total student training days. This proration appeared to reflect closely the actual usage in the main clinic area.

Indirect Instructional Costs at the Institute

Definition. Indirect instructional costs at the Institute consisted of the overhead activities which supported instructional programs. While each Institute had a different categorization of the overhead activities, the major areas were (1) administration, (2) office printing services, (3) registrar's office and student services, (4) resource centre, (5) supply and transportation, and (6) staff development. In addition, Kelsey included the associated studies division as an overhead category in its accounting.

Both the actual operating costs for these areas and an annual use charge on equipment (again assuming a 10 year life) were derived. (See Appendix J, Table 62 for annual use charges on overhead equipment.)

The associated studies division at Kelsey requires some further explanation because no such division existed at Wascana. At Wascana the instruction in general education areas (e.g. natural sciences and social sciences) was carried out by each division for its own students. At Kelsey the associated studies division, a separate division, provided this instruction in all program areas. Thus the direct instructional costs at Wascana included the costs for the general education courses. Because of this difference, neither direct instructional nor indirect instructional costs were comparable between the institutes. The combination of direct and indirect instructional costs, however, did provide meaningful comparative data.

Allocation basis. Indirect instructional costs were allocated to programs using each program's proportion of the total student training days. Total student training days referred to the largest number of students enrolled during the year multiplied by the number of training days in the program. Where total indirect costs were available for a division, the number of student training days for the entire division was used as the total. Each program's proportion of that total was then used to prorate the total division costs among the programs in the division. Where total indirect costs were available only for the entire Institute, each program's proportion of the total student training days for the entire Institute was used to prorate indirect costs. (This allocation approach is referred to as the student training day allocation approach herein. See Appendix J, Tables 63, 64 and 65 for a breakdown of student training days.)

Sources of data. The same data sources were used as in the case of direct instructional costs.

Physical Plant Costs

Definition. Physical plant costs consisted of maintenance costs for buildings and an annual use charge on the book value of buildings (costs at the time of construction). The annual use charge was calculated assuming a 50 year life for buildings as recommended by NCHEMS (1977:2.44).

Sources of data. With the exception of the dental division at Wascana Institute, actual maintenance and construction costs were readily available from the Department of Government Services. (See Appendix J, Tables 66 and 67.) A separate discussion of the dental division is presented later since the source of data and the procedures used to derive physical plant costs for programs at that division differed somewhat from the other programs.

Allocation approach. With the exception of the dental division, physical plant costs were allocated to programs using a two-staged approach. First, the proportion of the total institute square footage attributable to the health sciences area was used to allocate maintenance costs and annual use charges to the health science program area in each Institute (see Appendix J, Table 68 for the square footage and proportions involved). Second, because square footage by specific program was not available, the allocation of costs among the specific health science programs was done using the student training day allocation approach.

Dental division, Wascana. The determination of both construction and maintenance costs at the dental division posed problems. The division is housed in a separate facility which is part of the Regina General Hospital complex. (The facility was formerly a nurses residence for the Regina General Hospital.) The entire hospital complex was acquired by the provincial government in 1974. Neither the initial construction costs nor a market valuation on the facility housing the dental division was available. Moreover, parts of the structure were 45 years old and major renovations were required to make the facility suitable as an instructional facility. Because of these background factors, the initial construction costs were ignored and the annual charge was calculated on the value of renovations alone (see Appendix I).

The determination of maintenance costs posed problems because the Department of Government Services did not pay the full costs in this regard. The hospital continued to provide some services. Consequently, as discussed in Appendix I, maintenance costs were estimated using the prevailing maintenance and operation rates for rented facilities.

Once the values for the annual use charge and maintenance costs were obtained for the division, costs were then allocated to the dental nursing and dental assistant programs. Again the student training day allocation approach was used in this regard. (In 1974-75, however, the dental assistant program did not exist.)

Central Department Costs

Definition. NCHEMS (1977:2.20) recommends that a proportional share of the administrative expenses of state agencies or other contributing organizations should be included in cost studies. In that the Department of Continuing Education was directly responsible for the administration of the two institutes, proportions of the central office costs of that department were included in the costs of each health personnel training program.

Allocation approach. The allocation involved an analysis of the expenditure of the Department of Continuing Education and the identification of those branches which performed a support role to the institutes. Essentially, there were two types of support branches: those which provided support to all types of post-secondary institutions and those which were relevant only to the non-university sector of the post-secondary system. The expenditure of the institute relative to the total department and total non-university expenditure was used to allocate these costs (see Appendix J, Table 69).

Once central department costs were allocated to the Institutes, a sub-allocation to health science programs was made using the student training day allocation approach.

Total and Net Educational Institution Costs

The total educational institution costs for each program were derived by adding together the direct instructional, indirect instructional, physical plant, and central department costs. The only exception was in the case of the health record administrator program where the costs of two classes provided by the University of Regina (computer science and statistics) were also included in the total cost. These costs were provided by the University of Regina; both the academic and administrative costs were included.

Net educational institution costs were derived by subtracting estimated tuition fee revenue from total educational institution costs. This was necessary as tuition fees were included in the student educational cost component of this study.

FOREGONE EARNINGS OF STUDENTS

The earnings foregone by students while enrolled in the training programs constituted the second cost component in this study.

Reference Groups

The value of foregone earnings was estimated using reference groups from the Saskatchewan labour force. With the exception of the operating room nursing program, the appropriate reference group in the case of each program was selected on the basis of three variables: age, sex, and education level. This first required an analysis of the characteristics of students enrolled in the training programs.

Age. Available data on the age distribution of enrolled students by program and the average age of graduates clearly revealed that the vast majority of students were in the 19 to 24 year old age group (see Appendix D, Table 48). This profile was evident in all three years of the study.

Sex. The female proportion of graduates exceeded 90 per cent in all programs and in all three years with the exception of psychiatric nursing where in 1975 and 1977 the proportions were 89 and 85 per cent. Overall females accounted for 97, 98 and 97 per cent of total graduates in 1975, 1976 and 1977, respectively (see Appendix D, Table 49).

Education level. In seven programs the prerequisite education level was grade 12. In the nursing assistant and dental assistant programs, the prerequisite was only grade 11. However, the vast majority of students in these two programs entered with complete grade 12 (see Appendix D, Table 50).

The reference group used for all programs with the exception of operating room nursing consisted of females with a grade 12 level of education who were in the 19 to 24 year old age category. In the case of the grade 11 prerequisite programs, supplementary analyses were undertaken using a grade 11 reference group.

The reference group for the operating room nursing program was registered nurses. No specific controls were included for sex or age.

Foregone Earnings Data

The age-earnings data for the grade 12 and 11 reference groups were obtained from a special tabulation of the 1971 Census of Canada (see Appendix B.1 for the data request).

The base earnings for the grade 12 and 11 reference groups were the average employment incomes for Saskatchewan female wage earners working on a full-time, full-year basis as provided by the special tabulation (see Appendix G, Tables 56 and 57.) Since these data were actually 1970 earnings, it was necessary to adjust the earnings upwards to reflect the situation in the years covered by this study - 1974, 1975 and 1976. The upwards adjustment was made using the Industrial Composite Index. A discussion on the use of this index is presented in Appendix F. While the special tabulation provided average employment income by age category, the categories did not coincide with the age group enrolled in the training programs. Both a 15 to 19 and a 20 to 24 age group were presented in the tabulation, but the enrolled age group ranged between 19 and 24. Consequently, an average of the employment incomes in the 15 to 19 and 20 to 24 age groups was used in this study.

The base earnings data for the registered nurse reference group, used in the case of operating room nursing, were taken from the salary scales for registered nurses in each year. Since some work experience is necessary prior to admission to the operating room nursing program, the third step on the salary scale was used. This assumed two years work experience.

Estimation of Net Foregone Earnings

The foregone earnings as described above were gross foregone earnings. Several adjustments, as noted in the review of the literature, were necessary in order to estimate a more realistic value of foregone earnings. The net foregone earnings in this study were derived by adjusting the gross foregone earnings data for unemployment and student wages. An exception was made for operating room nursing. Given the short duration of the program (18 weeks) and the general pattern of students coming directly from full-time employment, adjustments for unemployment and student wages were not appropriate.

The adjustments made for unemployment and students wages for all programs except operating room nursing were as follows:

Unemployment adjustment. The unemployment rates, disaggregated by the relevant age-sex-education characteristics for this study, were available for 1976 from a Statistics Canada (1978c:51-58) publication based on the 1976 Census of Canada. The only available data for 1974 and 1975 were from Statistics Canada's Labour Force Survey.

The unemployment rate in 1976 for Saskatchewan females with a high school level of education was 5.3 per cent. While the same type of disaggregated data were not available for 1974 and 1975, the Labour

Force Survey did reveal that Saskatchewan's overall unemployment rate was about one per cent higher in 1976 as compared to the previous two years. The overall unemployment rates were 2.8 per cent in 1974, 2.9 per cent in 1975 and 4.0 per cent in 1976 (Statistics Canada, 1975:84; 1976a:54; and 1976b:76). Because of this pattern, a 4.3 per cent unemployment rate for Saskatchewan females with a high school level of education (one percentage point lower than in 1976) was used for 1974 and 1975.

The 1976 unemployment rates were based on only those females who were considered part of the labour force. Essentially, this included only persons actually working or seeking work. Females falling within this definition were considered to be the appropriate reference group for this study since persons enrolled in the training programs could have been available for employment had they devoted their time towards employment rather than training.

Student wages. Two forms of student wages were considered in estimating the net foregone earnings of students: wages earned by students while attending school (e.g. part-time employment) and wages earned by students while not attending school (e.g. summer earnings).

Statistics Canada's 1974 Post-Secondary Student Survey provided data on student wages. A special tabulation identifying non-university health science students in Saskatchewan was available. Since the survey covered May 1, 1974 to April 30, 1975, the results were used without adjustment for 1974. For the 1975 and 1976, the results were adjusted upwards using the Industrial Composite Index.

Before and After-Tax Net Foregone Earnings

The estimated net foregone earnings as described above were before-tax values and as such they were suitable for the social cost calculations. However, after-tax net foregone earnings were essential for the private cost calculations. An income tax adjustment was made, using the approach described in Appendix H, to provide the estimates for private cost calculations.

GOVERNMENT SUBSIDIES TO STUDENTS

The third cost component in this study consisted of government subsidies to students. Three subsidies were considered: coverage of interest charges on Canada Student Loans, Saskatchewan Student Bursaries, and Canada Manpower training allowances.

Interest Charges on Canada Student Loans

Under the Canada Student Loans plan, eligible post-secondary students are awarded loans on the basis of their financial need. The Government of Canada covers the cost of interest on these loans while the student is enrolled in an educational program. Since the loan itself is repayable, only the coverage of interest charges can be considered as a government subsidy to students. Another type of subsidization would occur in the case of students who defaulted on the payment of loans. However, since the available information suggested a low incidence of default on the part of Saskatchewan students to date, only the interest charge subsidization was considered in this study.

The value of interest charges on Canada Student loans was estimated by considering the proportion of post-secondary students who received loans, the average amount of the loans, and the prevailing interest rates. This information was provided by the Department of Continuing Education (see Appendix B.2). The assumption was that the overall averages for post-secondary students reflected the situation for health science programs included in this study.

Saskatchewan Student Bursaries

The Saskatchewan Student Bursary program provides non-repayable bursaries to eligible students on the basis of financial need. The program works in conjunction with the Canada Student Loan Plan, but not all students receiving a loan are awarded a bursary (a certain amount of loan must be issued first). Since the bursaries are non-repayable, the entire amount of these awards was regarded as a government subsidy to students.

The value of bursary awards was estimated by considering the proportion of post-secondary students who received such awards and the average amount of the awards. These data were provided by the Department of Continuing Education (see Appendix B.2). Again the assumption was made that the overall averages for post-secondary students reflected the situation for the health science programs included in this study.

Canada Manpower Training Allowances

The Canada Employment and Immigration Commission (known as the Department of Manpower and Immigration during the years covered by this study and, thus, referred to herein as Canada Manpower) provides training allowances to its clients. However, only training programs of one year or less, with no more than a high school education prerequisite, are eligible. Moreover, only the Canada Manpower sponsored clients in those programs receive training allowances.

Six of the 12 training programs in this study met the program length criteria for Canada Manpower's support. Excluded were the five two year programs and the operating room nursing program.

Canada Manpower provides four types of allowances: travel allowance, commuting allowance, living away from home allowance, and the regular (living) allowance. Not all students receive each type of allowance. Eligibility for the various allowances and the amount of each allowance are dependent upon the student's circumstances relative to the criteria for allowances. Rather than dealing with each type of allowance by various categories of students, the approach used in this study was to derive the total amount paid in allowances per program and the average amount paid per full-time trainee per program. The total amount of allowances was used in the social cost calculations and the average allowance per full-time trainee was used in the private cost calculations. In addition to training allowances, Canada Manpower pays the costs of books and supplies for its trainees.

The data pertaining to training allowances were available through a special computer run provided by the Canada Employment and Immigration Commission (see data request in Appendix B.3).

STUDENT EDUCATIONAL COSTS

Student educational costs represented the fourth cost component in this study. These consisted of tuition fees and other direct educational costs to the student.

Tuition Fees

Data on tuition fees were available from the Department of Continuing Education. The fee levels remained constant throughout the entire period under review.

Other Educational Costs

This category comprised student association fees and the expenses for books, supplies and equipment.

Data on the student association fees were available from the Department of Continuing Education. The fee levels remained constant throughout the period under review.

The 1974 Post-Secondary Student Survey conducted by Statistics Canada provided the necessary data on expenses for books, supplies and equipment. A special tabulation for Saskatchewan non-university health science students was used. The appropriate values for 1975 and 1976 were estimated by adjusting the 1974 figures upwards using the Consumer Price Index for Recreation, Education and Reading as provided by Statistics Canada's publication entitled Price and Price Indexes (see Appendix J, Table 70).

IMPUTED COSTS OF INTEREST ON PHYSICAL PLANT AND OF PROPERTY TAX EXEMPTIONS

As noted in the review of the literature, social cost calculations should include the imputed costs of interest on the physical plant and the imputed costs of property tax exemptions. These imputed costs constituted the final cost component in this study.

Interest on Physical Plant

The NCHMES (1977:2.44-2.45) recommendation of including an "equitable amount of interest expense" on the physical plant was followed in this study. The actual cost of borrowing funds by the Government of Saskatchewan was used to reflect an "equitable amount of interest expense." Data provided by the Department of Finance revealed that the cost of borrowing ranged between 9 7/8 per cent and 10 1/4 per cent during the period under review (see Appendix B.4). Therefore, a rate of 10 per cent was used in all years of this study.

Since construction cost values were available for only the entire physical plant, the imputed interest had to be first calculated for the entire facility. An amount was then allocated to the health science program area using its proportion of total square footage. Finally, an amount was allocated to each program using the student training day allocation approach. A deviation to this was made in the case of the dental division in that the renovation costs, not construction costs, were used to provide the first set of figures (see Appendix I).

Property Tax Exemptions

The value of property tax exemptions was obtained from the Cities of Regina and Saskatoon for Wascana (Parkway Campus) and Kelsey Institutes, respectively (see Appendix B.5 and B.6).

As with the annual use charge and imputed interest, the property tax exemption was first derived for the entire facility and then broken down by combining the square footage and student training day allocation approaches. An exception was made for the dental division where property tax exemption data were not available. Again this was due to the fact that the facility housing the division was part of the Regina General Hospital complex. As an alternative, the property tax component of prevailing rental rates for similar facilities was used to estimate the value of property tax exemptions (see Appendix I). Once the value for the total division was calculated, the amount was allocated among the programs using the student training day allocation approach.

SOCIAL AND PRIVATE COSTS

Both the costs to society (social costs) and the costs to the individual (private costs) were included in this study.

Social Costs of Training

Components. The social costs of training consisted of the five major cost components in this study with necessary adjustments to avoid double counting. Therefore, the total social cost was the sum of net educational institution costs, net foregone earnings of students, government subsidies to students, student educational costs, and the imputed costs of interest on the physical plant and of property tax exemptions. To determine total net foregone earnings and student educational costs, the costs per student were multiplied by the total number of students enrolled in the program.

Per student social costs. In one year or less programs, per student social costs were determined by dividing total social costs for a program by the enrolment in that program. For two year programs, the same procedure was used except the resulting figure was doubled to provide the per student cost for the two years of the program.

Per graduate social costs. In one year or less programs, per graduate social costs were determined by dividing total social costs for a program by the number of graduates from that program. The per graduate cost calculation for two year programs involved adjustments to reflect the fact that net foregone earnings of students, government subsidies to students and student educational costs were reduced due to attrition. In effect, students who dropped out did not lose two years of earnings, nor did they receive government subsidies or incur educational costs for two years. No such adjustment was considered for one year programs as students who dropped out probably did lose the greater part of a year's earnings and they still would have received some government subsidies and incurred educational costs.

Deriving the appropriate adjustment for two year programs posed much difficulty. However, an analysis of student attrition, presented in Appendix E, revealed the dominant pattern was for most attrition to occur in year one. Accordingly, an adjustment was made assuming that on the average students who dropped out lost earnings for only one year, government subsidies to these students would have been paid for only one year, and educational costs would have been incurred by these students for only one year. The total social cost calculation was then revised by multiplying total tuition fee revenue, total student net foregone earnings, government subsidies to students, and student educational costs by the appropriate adjustment factor. Further explanation on the derivation of this adjustment factor and the value of the factor used for each program are presented in Appendix E.

The revised total social cost for each program in a given year was then divided by the number of graduates. The resulting figure was doubled to provide the per graduate cost for two years of the program.

Private Costs of Training

Components. The total private cost of training consisted of net foregone earnings after tax and student educational costs.

Types of student. The private cost, as described above, was applicable in the case of self-supporting students. For bursary recipients, the total private cost was lowered by the amount of the average bursary award. For Canada Manpower allowance recipients, two adjustments were necessary. First, the total private cost was reduced because these students did not incur any direct educational costs. Second, the remaining net foregone earnings after tax were reduced by the amount of the average training allowance per full-time trainee.

SUMMARY OF CHAPTER 3

This chapter presented the methodology used in this study for the estimation of costs. The costing approach involved the estimation of the full costs of training. The five major cost components included in the study were (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) the imputed costs of interest on buildings and of property tax exemptions. The procedures used to estimate costs for each of these cost components were described.

Both social and private costs of training were considered in the study. The procedures used to derive total, per student, and per graduate social costs were described in this chapter. Also, procedures for estimating private costs for self-supporting students, bursary recipients, and Canada Manpower allowance recipients were outlined.

Chapter 4

THE METHODOLOGY FOR CONSTRUCTING EARNINGS PROFILES AND FOR MEASURING RETURNS ON INVESTMENT

Both the monetary costs and monetary benefits of training are essential elements in the analytical framework provided by the theory of human capital. The central focus of the analytical framework is on the relationship between costs and benefits or, alternatively stated, on the monetary returns to investment in training. This chapter describes the methodology used in the study to estimate monetary benefits in the form of earnings differentials. The chapter also outlines the approaches used to measure the returns on investment in non-university health personnel training.

The earnings differentials associated with non-university health personnel training were estimated by examining the earnings of health personnel as compared to their reference groups. Since age-earnings profiles for health personnel were not available, these were constructed using basic earnings data and labour force activity patterns. Three earnings profiles for health personnel and corresponding earnings profiles for the reference groups were constructed. The following sections of this chapter describe the basic earnings data, the adjustments for labour force activity, and the procedures used in constructing the earnings profiles. The final section of the chapter describes the four methods used in this study to measure the returns on investment.

BASIC EARNINGS DATA FOR HEALTH PERSONNEL

The basic earnings data for health personnel were obtained from salary scales contained in collective bargaining agreements. The rationale for this approach and the specific procedures adopted in using the data sources are discussed below.

Use of Collective Bargaining Agreements

The use of salary scales from collective bargaining agreements was justified in that all the health personnel groups included in this study were covered by such agreements. Moreover, estimates provided by the Department of Health revealed that, with the exception of two occupational groups, over 90 per cent of health personnel within each group were covered by collective bargaining agreements. Furthermore, in five of the nine groups, the proportion exceeded 95 per cent (see Appendix B.7).

Health record administrators and certified dental assistants were the two exceptions. Only 75 per cent of health record administrators were covered by a collective bargaining agreement according to the estimates provided by the Department of Health. The situation regarding certified dental assistants was less clearcut. All certified dental assistants employed in the government's dental plan were covered by a collective bargaining agreement. Data as to the proportion of certified dental assistants covered by collective bargaining agreements in the private sector were not available; although the proportion was thought to be small. However, the available data indicated that approximately one half of the employed certified dental assistants in the province were employed in the dental plan. Of the 271 certified dental assistants employed in Saskatchewan in 1977, a total of 133 or 49 per cent were employed with the dental plan (Department of Health 1977a and 1977b).

Therefore, even in the case of the two exceptions, the evidence suggested that a substantial proportion of health personnel were covered by collective bargaining agreements. In view of this situation, salary scales contained in collective bargaining agreements were used as the source of basic earnings data for all the health personnel groups in this study.

Procedures Adopted in Using Salary Scales

Three decisions were essential in using the salary data contained in collective bargaining agreements. First, the appropriate classification for each health personnel group had to be ascertained. Second, the rate of progression through the salary scale had to be established. Finally, the relevant collective bargaining agreement, in terms of the time period covered, had to be selected.

Appropriate classification. Only one salary scale classification existed for each health personnel group except for registered nurses, registered psychiatric nurses, and medical laboratory technologists. In selecting the appropriate classification in those cases where more than one existed, the choice was delimited to non-supervisory positions. The health personnel training programs in this study were not designed to train persons for supervisory positions and, moreover, there were more highly trained university level graduates in these areas (e.g. degree nurses and degree level medical laboratory technologists). The assumption, then, was that the health personnel included in this study would remain in non-supervisory positions throughout their working career. While it was not possible to thoroughly assess this assumption against the real-world situation, some data on this matter were available from the Saskatchewan Registered Nurses' Association (SRNA). According to the SRNA (1977:12), 77 per cent of registered nurses in the province were general duty nurses (considering only those who reported their position). Moreover, both degree and diploma graduates are included in the population of registered nurses. Given the likelihood that degree level nurses held proportionately more of the supervisory positions, the percentage of diploma level nurses in general duty nursing positions probably substantially exceeded the 77 per cent figure.

By ruling out supervisory positions, there was only one remaining classification for registered nurses. However, in the case of registered psychiatric nurses and medical laboratory technologists, two or more classifications still existed.

In the case of registered psychiatric nurses, consultation with the Saskatchewan Public Service Commission revealed that the normal promotional pattern is for a person to move from the Nurse 1 to Nurse 2 and finally to the Nurse 3 classifications. Beyond the Nurse 3 level, classifications are essentially supervisory in nature. In using the salary scale data, this promotional pattern was followed assuming the change of classification would occur at that point where the salary scales overlapped. This meant a registered psychiatric nurse would be in the Nurse 1 classification for three years, in the Nurse 2 classification for the next three years, and in the Nurse 3 classification thereafter.

The medical laboratory technology employment situation was unique among the programs studied. After completing the one year Institute program, graduates generally spend one year in a hospital laboratory placement. This internship is separate from the educational program of the Institute, but is necessary to become eligible for registration with the Canadian Society of Laboratory Technologists. During the hospital placement period these persons receive remuneration for services rendered. Prior to 1976 this was in the form of a stipend. However, with the Labour Relations Board ruling that these persons met the definition of employee, salaries have been paid since 1976. In effect, as a consequence to the ruling, these persons became part of collective bargaining agreements and the salary level achieved ($659 per month in 1976) greatly exceeded the former stipend level ($260 per month in 1974 and 1975). Thus, the internship year was regarded as the first year of earnings in this study.

After the internship year, the same problem arose with medical laboratory technologists as in the case of registered psychiatric nurses in that more than one classification existed. Consultation with the Laboratory Standards consultant in the Department of Health revealed that the normal promotional pattern would be for a person to move from the Technologist 1 classification to the Technologist 2 classification after four years of work experience.

Rate of progression. The second matter requiring attention in using the salary scale data was the rate at which a person would typically progress through the salary scale. While no specific data were available on this matter, the general consensus was that the majority of persons would progress one step at time on an annual basis. This assumption was used herein in constructing the earnings profiles.

Relevant agreement. The intent was to use the salary data corresponding to the calendar years of this study; namely, 1974, 1975 and 1976. Fortunately, the collective bargaining agreements were on a calendar year basis for six of the nine groups. Accordingly, the 1974, 1975 and 1976 salary scales were used.

However, the salary scales for registered psychiatric nurses, dental nurses and certified dental assistants were part of the agreements between the Government of the Province of Saskatchewan and the Saskatchewan Government Employees' Association. These agreements cover the period October 1 to September 30. Therefore, in any one calendar year there was one salary scale for the first nine months and another for the last three months. To avoid distortions in the relative salaries among occupations, revised salary scales were constructed to reflect the 1974, 1975 and 1976 calendar years. In doing this, a weighted average was calculated for each step in the salary scales.

BASIC EARNINGS DATA FOR THE REFERENCE GROUPS

As noted in the discussion of student foregone earnings, three reference groups were used in this study. With the exception of the operating room nursing program, a grade 12 reference group was used for all programs. A supplementary analysis using a grade 11 reference group was conducted for the nursing assistant and dental assistant programs. In the case of operating room nursing, registered nurses were used as the reference group because only those persons were eligible for admission to the program.

Grade 12 and 11 Reference Groups

The age-earnings data for grade 12 and grade 11 reference groups were obtained from a special tabulation of the 1971 Census of Canada (see Appendix B.1 for data request). The earnings data used in this study were for Saskatchewan females working on a full-time, full-year basis as wage earners. The 1971 Census data (which reported 1970 earnings) were revised upwards using the Industrial Composite Index to reflect the 1974, 1975 and 1976 situation. The age-earnings data are presented in Appendix G, Tables 56 and 57. A discussion on the use of the Industrial Composite Index is presented in Appendix F.

Registered Nurse Reference Group

The earnings data for the registered nurse reference group were obtained from the salary scales in the collective bargaining agreements. In accordance with the assumption made in deriving foregone earnings, the third step on the salary scale was used as the reference point for the operating room nurses in their first year of employment. The next higher step was used in the following year and so on.

ADJUSTMENTS FOR LABOUR FORCE ACTIVITY

Five adjustments for labour force activity were used in constructing earnings profiles in this study. These adjustments were for (1) the probability of survival, (2) labour force participation, (3) employment, (4) full-time versus part-time employment, and (5) the workload of part-time employees. The following section discusses each of these adjustments and the source of data used in each case.

Adjustment for Survival

The reduced potential for labour force activity due to death prior to reaching the retirement age of 65 was taken into account by computing the probability of survival at each future age. (Some studies have expressed this adjustment in the converse, the mortality rate.) The probability of survival is referred to herein as the survival rate.

The survival rate at each future age up to age 65 was determined using Statistics Canada's (1974) life tables. The specific tables for Saskatchewan females were used to determine probabilities based on a starting age of 20 years. This was the lowest average age of graduates among the 12 programs considered in the study. Since the average age of graduates ranged between only 20 and 24, separate probability calculations were not warranted.

Adjustments for Labour Force Participation

The second adjustment was for the likelihood of participation in the labour force. Essentially, the labour force referred to those persons who were willing and available for work. The adjustment is referred to herein as the labour force participation rate.

The labour force participation rate was obtained from the 1976 Census of Canada conducted by Statistics Canada. While results were not available for the specific occupations included in this study, disaggregated data, cross-classified by age, sex, province, and education level were available. The "Post-Secondary Non-University with Certificate or Diploma" category was used as the reference category for the health personnel groups in this study. The "Grade 12-13 with Secondary School

Graduation Certificate" and the "Grade 11" categories were used to provide the data for the grade 12 and grade 11 reference groups, respectively.

Statistics Canada (1978:vi) defines the "labour force" in its 1976 census publications as the "non-inmate population, 15 years of age and over who, in the week prior to enumeration were (a) employed or (b) unemployed." The "employed" category generally includes persons who (1) worked for pay or in their own business, farm, or professional practice; (2) helped without pay in a family business or farm; or (3) had a job from which they were temporarily absent for reasons other than lay-off. The "unemployed" includes persons not classified as employed who (1) looked for work and were available to start work; (2) were on temporary lay-off; or (3) who had definite arrangements to start a new job at a future date. The labour force participation rate, as defined by Statistics Canada, is "the percentage the total labour force (employed plus unemployed) forms of the population 15 years and over in the area or category."

The 1976 labour force participation rates for Saskatchewan females cross-classified by age and education level were used in the construction of earnings profiles in this study.

Adjustment for Employment

Since the labour force participation rate included both employed and unemployed persons, a further adjustment was necessary to focus only on persons with employment earnings. The employment rate used in this study refers to the percentage of the labour force actually employed. This rate was derived using Statistic Canada's "labour force" and "employed" categories.

Again, the 1976 Census of Canada data for Saskatchewan females were used. The specific categories and the cross-classifications used for reference purposes were identical to those used in the case of the labour force participation rate.

Adjustment for Full-Time Versus Part-Time Employment

The employment rate did not distinguish between full-time and part-time workers. This distinction was crucial, however, in the construction of earnings profiles.

A breakdown of the employed female labour force in Saskatchewan was available from Statistics Canada's Labour Force Survey which publishes both monthly results and annual averages (the latter were used in this study). However, no breakdown by education level was available from this survey.

Statistics Canada (1977:76) defines full-time employment in the Labour Force Survey as consisting of persons who usually work 30 hours or more per week, plus those who usually work less than 30 hours, but consider themselves to be employed full-time. Part-time employment comprises all other persons who usually work less than 30 hours per week.

Only the 1976 data from the Labour Force Survey were used because of the lesser reliability of data and the lack of disaggregated data in previous years. In January 1976, the sample size for Saskatchewan was increased to permit further disaggregation by sex and age category. However, even the revised survey did not have an adequate sample size to provide reliable disaggregated data on all survey items. In fact, the full-time versus part-time breakdown was available for only the total female employed labour force. No breakdown by age category was available.

Because of the aggregated nature of the data pertaining to full-time versus part-time employment, attempts were made to validate the results in terms of the health occupations included in this study. The only source of data was the Saskatchewan Registered Nurses' Association (SRNA). The breakdown of employment as reported by the SRNA (1977:2) reflected the breakdown provided by the Labour Force Survey as shown below:

	SRNA Data for 1976	Labour Force Survey Data for 1976
Percentage Working Full-Time	72.6	74.1
Percentage Working Part-Time	27.4	26.9

The assumption was made that the full-time versus part-time distribution of employment, as provided by the Labour Force Survey, reflected the situation for both health personnel and their reference groups.

Adjustment for the Workload of Part-Time Employees

A final adjustment in constructing the earnings profiles was the workload of part-time employees. More specifically, the time spent working by part-time employees as compared to full-time employees was taken into account.

Again the Labour Force Survey was the only general source of data. However, in this case the data on Canadian females were not available on a disaggregated basis. No breakdowns by province, education level or age were available. Moreover, the first reporting of average hours worked by full-time versus part-time emloyees took place in 1977. Statistics Canada (1977:75) reported that persons working on a full-time basis worked an average of 34.4 hours per week while persons working on a part-time basis worked an average of 14.0 hours per week. The relative workload, therefore, for part-time employees was .407 of a full-time workload.

Since this workload figure was based on highly aggregated data, attempts were made to validate the figure in terms of the health occupations included in this study. Again the only source of data was the SRNA. But the data from that source were not sufficiently refined to make a direct comparison with the Labour Force Survey data. Preliminary results from the 1978 membership report of the SRNA indicated that the majority of part-time workers worked between 9 and 24 hours per week. Consultation with the SRNA's research coordinator revealed that the most common pattern of part-time employment for nurses was likely two shifts per week (8 hours per shift). On the basis of a 40 hour week, the part-time workload would be .40 (16/40). While this is clearly a rough estimate, it does coincide closely with the Labour Force Survey data.

The assumption was made that the workload data, as provided by the Labour Force Survey, reflected the situation for health personnel and their reference groups.

CONSTRUCTION OF THE EARNINGS PROFILES

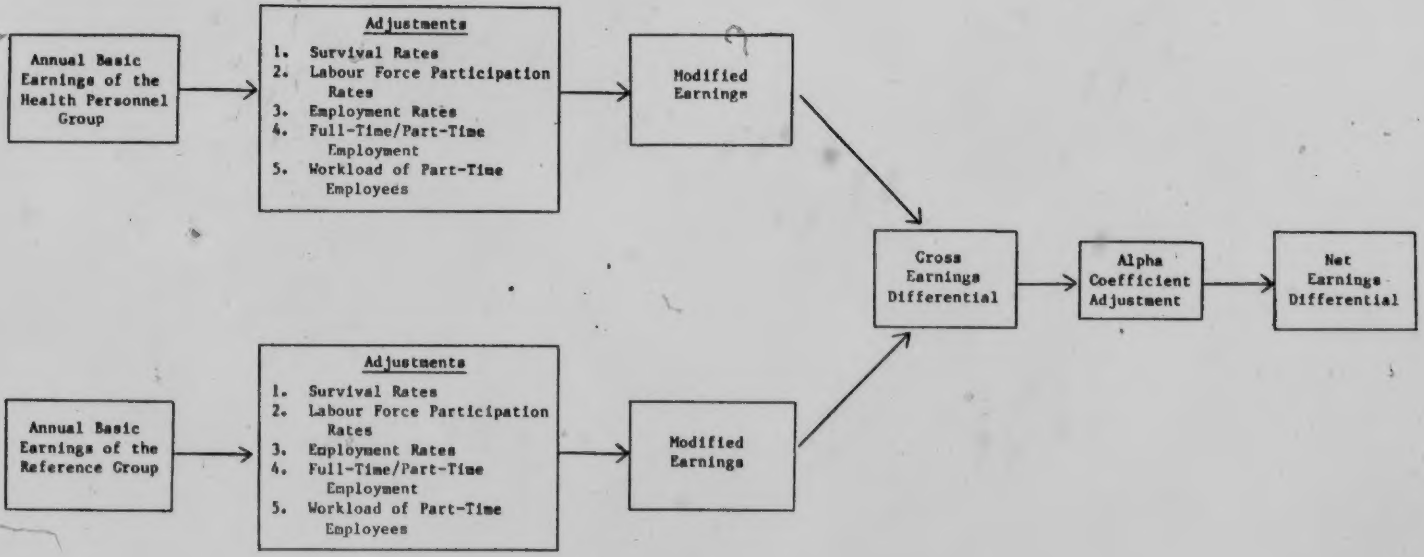
A simulation modelling approach was used to construct earnings profiles in this study. The computer programming made it possible to adjust the basic earnings data for labour force activity and thereby generate modified earnings. The programming also made it possible to adjust the gross differential between the modified earnings of health personnel and their reference groups by an alpha coefficient. The alpha coefficient, as discussed in the review of literature, refers to the proportion of the earnings differential which can be attributed to the effect of training. Alpha coefficients of 77 and 100 per cent were used in the study. A schematic diagram of the earnings profile construction process is presented in Figure 1.

The basic earnings data for health personnel had a maximum of seven increments, depending on the occupation. Accordingly, once the top of the salary scale was reached, the salary was held constant for the remainder of the working years. The basic earnings data were assembled using one year age intervals. A stream of annual earnings from the age at graduation to age 65 was established. Since the study was designed to provide both social and private analyses, the construction of earnings profiles was done separately for each analysis. Before-tax annual earnings were used in the social calculations whereas after-tax annual earnings were used in the private calculations. (See Appendix H for the income tax calculations.)

Essentially the same procedures were used for the reference groups except that age-earnings data were available for the grade 12

FIGURE 1

THE EARNINGS PROFILE CONSTRUCTION PROCESS


Annual Basic Earnings of the Health Personnel Group
Adjustments
1. Survival Rates
2. Labour Force Participation Rates
3. Employment Rates
4. Full-Time/Part-Time Employment
5. Workload of Part-Time Employees
Modified Earnings
Annual Basic Earnings of the Reference Group
Adjustments
1. Survival Rates
2. Labour Force Participation Rates
3. Employment Rates
4. Full-Time/Part-Time Employment
5. Workload of Part-Time Employees
Modified Earnings
Gross Earnings Differential
Alpha Coefficient Adjustment
Net Earnings Differential

Notes.

(1) Before-tax and after-tax earnings profiles were constructed separately.

(2) Not all adjustments were made for each earnings profile.

and 11 reference groups. Unlike the basic earnings of health personnel, which remained constant once the top of the salary scale was reached, the earnings of the grade 12 and 11 reference groups tended to increase throughout the working years.

The following describes the three earnings profiles constructed in this study.

Earnings Profile A

This earnings profile was simply the basic earnings data. The assumptions were that all health personnel and their reference groups would survive to age 65 and that they would work on a full-time basis throughout their lifetime. The earnings in each year under this profile were regarded as the maximum earnings.

There were two reasons for the inclusion of earnings profile A in this study. First, the profile established an upper limit with which to compare the other profiles in this study. Second, several other studies have made similar assumptions and thus the comparability of results was enhanced.

Earnings Profile B

Earnings profile B included adjustments for survival and employment. Specifically, the maximum earnings in each year for both health personnel and their reference groups, as given in earnings profile A, were adjusted as follows:

$$B = A \times S \times ER$$

where: B is the modified earnings

A is the maximum earnings

S is the survival rate

ER is the employment rate

The rationale for the inclusion of earnings profile B was that recognition of the possibility of death and unemployment are necessary to provide the realistic upper limit for earnings.

The inclusion of earnings profile A or B in a study focused exclusively on females raises some questions since the labour force participation issue is overlooked. In fact, many previous studies have completely excluded females from this type of study on the assumption that their low rate of labour force participation would produce low, if not negative, earnings differentials over a lifetime. But the trend of rising female labour force participation makes such an assumption increasingly questionable. Also, as Woodhall (1973:14-15) notes, it is misleading to assume that females have zero productivity if they do not participate in the labour force. Time devoted to housework and, particularly child raising, likely have substantial economic value although it may be difficult to measure. One way of approximating the value of female productivity outside the labour force is to look at foregone earnings. Juster (1975:21) raises the argument that "women will enter the labour force when their productivity on the market exceeds their productivity at home . . . ." Therefore, earnings profile B can be regarded as an approximation of the value of the productivity of females.

Earnings Profile C

Earnings profile C was designed to reflect real-world average earnings and, accordingly, adjustments for five labour force activity factors were included. Specifically, the maximum earnings in each year for health personnel and their reference groups, as given in earnings profile A, were adjusted as follows:

$$C = [A \times S \times PR \times ER] \times [FT + (PT \times WL)]$$

Where: C is the modified earnings
A is maximum earnings
S is the survival rate
PR is the labour force participation rate
ER is the employment rate
FT is the proportion of employed workers working full-time
PT is the proportion of employed workers working part-time
WL is the workload of part-time employees.

The inclusion of earnings profile C was regarded as a major dimension of this study because of the relatively little attention which has been given to date to the earnings differentials associated with education or training of females. The statistics on female labour force participation used in this study were from the most recent data available.

MEASUREMENT OF THE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

The measurement of returns to health personnel training first required the calculation of additional lifetime earnings (lifetime earnings differentials). This was done by deriving the difference between the earnings of health personnel and their reference groups at each age from the time of graduation until retirement at age 65. The annual differences were then totaled and the cost of training subtracted to obtain the lifetime earnings differential. Before-tax earnings and the social costs of training were used in computing the social lifetime earnings differentials, whereas after-tax earnings and private costs were used in deriving the private lifetime earnings differentials. In addition, lifetime earnings differentials were adjusted using alpha coefficients of 77 and 100 per cent.

Four methods were used to measure the relationship between the monetary costs and monetary benefits of health personnel training: (1) payback period, (2) net discounted present value, (3) benefit/cost ratio, and (4) internal rate of return. Each of these methods is described in the following sections.

Payback Period

Van Horne, Dipchand and Hanrahan (1975:155) define the payback period as the number of years required to recover an initial cash investment. In this approach no consideration is given to the differing value of a dollar over time.

Net Discounted Present Value

This approach, like the benefit/cost ratio and internal rate of return approaches which are discussed later, is a discounted cash flow technique. Discounted cash flow approaches, according to Horngren (1967:442), recognize that the use of money has a cost. In essence, discounting takes into account that a dollar in the hand today is worth more than a dollar to be received in the future. The reason is that a sum of money today could be invested and earn interest.

The use of discounted cash flow methods to evaluate investment projects is well supported in the cost accounting and financial management literature. Van Horne, Dipchand and Hanrahan (1975:155) argue that such methods provide a more objective basis for evaluating and selecting investment projects than the payback method. Horngren (1967:442) argues that because the discounted cash flow methods explicitly and routinely weigh the time value of money, they are the best method to use for long-range investment decisions. As noted in chapter 2, discount rates of 5, 10 and 15 per cent were used in this study.

Discounted cash flow approaches have become an integral part of human capital studies. Using the discounted present value approach, the earnings differential over a lifetime can be expressed in terms of its present value and then compared with the costs of training. In this study, the costs of training were treated as occurring in year 0 and the first earnings in year one. By including the cost into the equation, the net discounted present value of the total stream was calculated. The formula for deriving the net discounted present value can be stated as follows:

$$NDPV = C + \frac{NE_1}{(1+r)} + \frac{NE_2}{(1+r)^2} + \ldots + \frac{NE_n}{(1+r)^n}$$

Where: NDPV is the net discounted present value

C is the cost of training

NE_1 is the net earnings differential in year 1

NE_2 is the net earnings differential in year 2

r is the rate of discount

n is the total number of years over which the investment is discounted.

The general rules in an application of the net discounted present value approach, according to Sheehan (1973:34-35), are to invest as long as the present value is positive and to choose the project with the highest present value.

Benefit/Cost Ratio

The benefit/cost ratio is essentially a variant of the net discounted present value method. Van Horne, Dipchand and Hanrahan (1975:161) note that the benefit/cost ratio, or the profitability index as it is sometimes called, is the present value of the future net cash flows over the initial cash outlay. The formula, as applied in this study, can be expressed as follows:

$$BCR = \frac{\frac{NE_1}{(1+r)^1} + \frac{NE_2}{(1+r)^2} + \ldots + \frac{NE_n}{(1+r)^n}}{C}$$

Where: BCR is the benefit/cost ratio

NE_1 is the net earnings differential in year 1

NE_2 is the net earnings differential in year 2

r is the rate of discount

n is the number of years over which the investment is discounted.

In a strict application of the benefit/cost ratio approach, an investment proposal would be acceptable if the ratio was equal to or greater than 1.0. A second rule would be to choose the project with the highest benefit/cost ratio.

Internal Rate of Return

The internal rate of return approach derives the rate of discount which will equate the present value of the expected cash outflows with the present value of the expected cash inflows. Since the costs of training in this study were treated as occurring in year 0, the costs were already expressed in terms of their present value. The formula, as applied in this study, can be expressed as follows:

$$C = \frac{NE_1}{(1+r)^1} + \frac{NE_2}{(1+r)^2} + \ldots + \frac{NE_n}{(1+r)^n}$$

Where: C is the cost

NE_1 is the net earnings in year 1

NE_2 is the net earnings in year 2

r is the internal rate of return

n is the total number of years over which the investment is discounted.

In a strict application of the internal rate of return approach, as noted by Sheehan (1973:34), the rule is to invest as long as the rate of return is greater than the "appropriate" market interest rate. Moreover, the project with the highest rate would be chosen.

Commentary on the Approaches

Of the four approaches described above, the payback period is certainly the most crude. Horngren (1967:452) states "payback, sometimes called payout or payoff, is a rough-and-ready method that is looked upon with disdain by many academic theorists." Yet this same author goes on to observe that this approach is still the most widely used method in capital budgeting. Although payback has not been widely used in human capital studies, there seems to be little reason to believe that the simplicity of the approach would be less attractive to decision makers in that context.

The three remaining approaches are discounted cash flow methods. Of the three, the net discounted present value approach is generally regarded as being superior. However, the user faces the difficult task of selecting the appropriate discount rate. The benefit/cost ratio is essentially a variant of the net discounted present value method. However, whereas the present value method expresses the returns from a project in absolute dollars, the benefit/cost ratio presents the returns in ratio form (relative to costs).

The internal rate of return approach does not require the user to select the appropriate discount rate, but much the same problem still arises as the derived rate must subsequently be compared with an external rate. Questions, therefore, arise as to what is the appropriate external rate.

Both the benefit/cost ratio and the internal rate of return approaches can be misleading when investments of different sizes are being compared. A small investment may have both a high benefit/cost ratio and high internal rate of return and yet have only minor economic consequences in absolute dollars.

Psacharapoulos (1973a:19) observes that both the net discounted present value and the internal rate of return methods have been used extensively in human capital studies. He also notes that while the present value is allegedly a more correct measure, the internal rate of return is still more popular. But the internal rate of return does suffer from a weakness in that several rates can be observed when the net earnings stream fluctuates between positive and negative. Van Horne, Dipchand and Hanrahan (1975:178) note that the number of internal rates of return in such situations is limited only to the number of reversals of sign in the cash-flow stream. This is an important point in regards to the present study because several situations emerged where the net earnings streams fluctuated between positive and negative. In those situations the internal rates of return were not meaningful.

A final observation is appropriate with respect to all four approaches. Essentially, the approaches were developed to analyze investment in physical capital. Within the accounting and financial management literature rules have been developed on how to use the approaches in making investment decisions. While these approaches can be applied to investment in human capital, a major caveat is in order. Despite the apparent rigor and finality of the approaches, the results can be regarded only as indicators at best. Given the difficulty in measuring returns to training and the restricted nature of analyses which focus solely on earnings, strict application of the rules as to when or when not to invest cannot be made. Although the monetary returns to training are an important concern, they should be supplemented by other indicators in reaching decisions about investment in training whether it be from the social or private standpoint.

SUMMARY OF CHAPTER 4

This chapter has described the methodology used in the study for the construction of earnings profiles. A simulation modelling approach was adopted for the construction of earnings profiles for both health personnel and their reference groups. The model permitted the adjustment of the basic earnings data for labour force activity. Also, the differentials between the modified earnings of health personnel and their reference group were further adjusted using an alpha coefficient to reflect the proportion of the differential which could be attributed to training.

The four methods used to measure the relationship between the monetary costs and benefits of health personnel training were outlined. These methods were (1) payback period, (2) net discounted present value, (3) benefit/cost ratio, and (4) the internal rate of return. The last three approaches were discounted cash flow methods which were regarded as being conceptually superior to the payback period method.

Chapter 5

THE COSTS OF HEALTH PERSONNEL TRAINING

This chapter presents the findings of the study regarding the costs of health personnel training.

Costs are first presented in terms of the five major cost components used in this study: (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) imputed costs of interest on the physical plant and of property tax exemptions.

Cost summaries are then presented from the social and private standpoints. Social costs are provided in terms of total costs and on per student and per graduate bases. The private costs are summarized for self-supporting students, bursary recipients, and training allowance recipients.

EDUCATIONAL INSTITUTION COSTS

A major part of this study involved the determination of educational institution costs. The four sub-components of educational institution costs were (1) direct instructional costs, (2) indirect instructional costs at the Institute, (3) physical plant costs, and (4) central department costs. While a program cost analysis was undertaken, cost determination in this study was not an end in itself. Rather the cost analysis was basically a means to deriving realistic per student and per graduate costs for use in the cost-benefit calculations. Accordingly, a detailed account of educational institution costs, as found in many cost studies, is not presented herein.

Since the costs of two year programs were very different from the costs of one year or less programs, the findings are presented separately.

Two Year Programs

Total educational institution costs broken down by sub-component, program and year are contained in Table 2. The corresponding per student and per graduate costs are provided in Appendix K, Tables 71 to 74.

Distribution of costs. The distribution of educational institution costs was fairly consistent across all programs. The largest component by far was direct instructional costs. Looking at all programs combined, direct instructional costs accounted for about 67 per cent of total educational institution costs. On a program basis, the highest proportion existed in dental nursing (74 to 79 per cent) and the lowest proportion existed in diploma nursing Kelsey (58 to 59 per cent). The low proportion for diploma nursing Kelsey must be interpreted cautiously because of the presence of the associated studies division which was included as an indirect instructional cost.

Overall, indirect instructional costs accounted for about 23 per cent of total educational institution costs. The largest proportion was in diploma nursing Kelsey. Taken together direct and indirect instructional costs accounted for about 90 per cent of educational institution costs.

Physical plant costs and central department costs constituted a relatively small part of educational institution costs.

Table 2

Total Educational Institution Costs by Cost Component, Program and Year

Two Year Programs

Program Year	Direct Instructional Costs $	Direct Instructional Costs %	Indirect Instructional Costs $	Indirect Instructional Costs %	Physical Plant Costs $	Physical Plant Costs %	Central Department Costs $	Central Department Costs %	Total Educational Institution Costs $	Total Educational Institution Costs %	Percentage Change in Total Educational Institution Costs Over Previous Year
Diploma Nursing Kelsey											
1974	718,125	57.9	370,551	29.9	122,962	9.9	29,304	2.4	1,240,942	100.0	
1975	917,842	59.2	447,086	28.9	146,590	9.5	39,381	2.6	1,550,899	100.0	+25.0
1976	966,325	57.6	510,921	30.5	158,863	9.5	40,182	2.4	1,676,291	100.0	+8.1
Diploma Nursing Wascana											
1974	577,938	70.5	180,912	22.1	39,927	4.9	21,573	2.7	820,350	100.0	
1975	722,820	67.4	240,257	22.4	81,271	7.6	28,651	2.7	1,072,998	100.0	+30.8
1976	854,912	68.0	287,365	22.9	85,002	6.8	30,852	2.5	1,258,130	100.0	+17.3
Psychiatric Nursing											
1974	371,566	72.8	103,939	20.4	22,938	4.5	12,428	2.5	510,869	100.0	
1975	435,846	72.8	111,964	18.7	37,874	6.4	13,397	2.3	599,081	100.0	+17.3
1976	472,123	72.9	125,106	19.4	37,006	5.8	13,392	2.1	647,627	100.0	+8.1
Dental Nursing											
1974	665,524	78.6	113,583	13.5	60,466	7.2	7,317	0.9	846,890	100.0	
1975	705,517	75.0	131,335	14.0	92,811	9.9	11,831	1.3	941,494	100.0	+11.2
1976	772,966	73.8	163,982	15.7	95,528	9.2	15,676	1.5	1,048,152	100.0	+11.3
Health Record Administrator											
1974	55,946	69.9	11,646	14.6	2,595	3.3	1,367	1.7	80,101[a]	100.0	
1975	69,358	69.6	16,928	17.0	5,726	5.8	1,955	2.0	99,770[a]	100.0	+24.6
1976	61,912	62.3	19,034	19.2	5,631	5.7	1,994	2.0	99,362[a]	100.0	-0.4
All Programs											
1974	2,389,099	68.3	780,631	22.3	248,888	7.1	71,989	2.1	3,499,152	100.0	
1975	2,851,383	66.9	947,570	22.3	364,272	8.6	95,215	2.3	4,264,242	100.0	+21.9
1976	3,128,238	66.2	1,106,408	23.4	382,030	8.1	102,096	2.2	4,729,562	100.0	+10.9

Note. Row totals may not be exact because of rounding.

[a] Includes costs of courses provided by the University of Regina which amounted to $8,547, $5,803 and $10,791 for 1974, 1975 and 1976, respectively. In percentage terms these costs amounted to 10.7%, 5.8% and 10.9% of total educational institution costs for 1974, 1975 and 1976, respectively.

Overall, physical plant costs accounted for eight per cent, ranging in 1976 from a low of six per cent for psychiatric nursing and health record administrator to a high of 10 per cent for diploma nursing Kelsey. Central department costs represented about two per cent of educational institution costs.

Total costs. During the period under review, total educational institution costs associated with two year health personnel training increased from $3.5 million to $4.7 million, a 35 per cent increase. Costs rose by 22 per cent between 1974 and 1975 and by another 11 per cent between 1975 and 1976. However, on a program basis there was substantial deviation from the average. The increase between 1974 and 1975 ranged from a low of 11 per cent for dental nursing to a high of 31 per cent for diploma nursing Wascana. Between 1975 and 1976, the percentage change in cost ranged from 0 per cent for health record administrator to 17 per cent for diploma nursing Wascana.

Per student costs. As shown in Table 3, per student educational institution costs varied considerably. The average costs were $7,393, $8,627, and $9,402 for 1974, 1975 and 1976, respectively. However, the ranges were from $4,665 to $14,602 in 1974, $6,106 to $13,076 in 1975, and $7,210 to $12,782 in 1976. In all three years diploma nursing Kelsey had the lowest per student cost and dental nursing had the highest per student cost.

Over the three year period, the average per student cost increased by 27 per cent, but the percentage change ranged from a decrease of 13 per cent for dental nursing to an increase of 67 per cent for

Table 3

Educational Institution Per Student and Per Graduate Costs by Program and Year

Two Year Programs

Program	Per Student Costs				Per Graduate Costs			
	1974 $	1975 $	1976 $	Change 76/74 %	1974 $	1975 $	1976 $	Change 76/74 %
Diploma Nursing Kelsey	4,665	6,106	7,210	+54.6	5,479	7,131	8,663	+58.1
Diploma Nursing Wascana	5,048	6,563	8,416	+66.7	6,434	8,383	9,791	+52.2
Psychiatric Nursing	5,975	8,321	9,963	+66.7	10,775	13,462	13,634	+26.8
Dental Nursing	14,602	13,076	12,782	-12.5	15,829	14,485	14,659	-7.4
Health Record Administrator	6,675	9,070	8,640	+29.4	9,424	11,738	10,459	+11.0
Average	7,393	8,627	9,402	+27.2	9,584	11,039	11,441	+19.4

diploma nursing Wascana and psychiatric nursing. The decrease in costs for dental nursing was largely due to enrolment increases during the period and the establishment of the dental assistant program in 1975 (the latter served to reduce physical plant costs).

Looking at the duplicated programs, namely diploma nursing, per student costs were considerably lower in the Kelsey program than in the Wascana program. The per student cost for the Kelsey program were $4,665, $6,106 and $7,210 for 1974, 1975 and 1976, respectively. The corresponding costs for the Wascana program were $5,048, $6,563 and $8,416.

Per graduate costs. As shown in Table 3, per graduate costs were substantially above per student costs. On the average per graduate costs were $9,584, $11,039 and $11,441 for 1974, 1975 and 1976. These costs were about $2,200, $2,400 and $2,000 higher than per student cost in the respective years.

Per student costs also ranged considerably among the programs: $5,479 to $15,829 in 1974, $7,131 to $14,485 in 1975, and $8,663 to $14,659 in 1976. Consistently, diploma nursing Kelsey had the lowest cost and dental nursing had the highest cost.

Over the three year period, per graduate costs increased by 19 per cent, a lesser rate of increase than for per student costs. This discrepancy was due to a decline in the overall level of student attrition during the period under review. A substantial range in cost changes was evident, from a decrease of seven per cent in the case of dental nursing to an increase of 58 per cent for diploma nursing Kelsey.

The comparison of the two diploma nursing programs again revealed that costs were consistently lower in the Kelsey program than in the

Wascana program. Per graduate costs in the Kelsey program were $5,479, $7,131 and $8,663 for 1974, 1975 and 1976, respectively. The corresponding costs for the Wascana program were $6,434, $8,383 and $9,791.

Net educational institution costs. Table 4 provides net educational institution costs, defined as total educational institution costs less tuition fee revenue. Overall, both the absolute and relative amount of tuition fee revenue declined during the period under review. Generally, enrolment declined during the period and tuition fees were held constant in all programs. Tuition fee revenue declined from constituting eight per cent of total educational institution costs in 1974 to six per cent in 1976. The consequence was that net educational institution costs increased at a faster rate than did total educational institution costs.

On a program basis the relative weighting of tuition fee revenue varied somewhat. While overall tuition fee revenue represented about 6 per cent of total educational institution costs in 1976, the range was from a low of four per cent for dental nursing to a high of 7 per cent for diploma nursing Kelsey.

One Year or Less Programs

Total educational institution costs broken down by sub-component are presented in Table 5.

Distribution of costs. Direct instructional costs accounted for the largest proportion of total costs, an overall average of 64 per cent. On a program basis the proportion ranged from a low of about 58 per cent in nursing assistant Kelsey to a high of 88 per cent in operating room nursing. Once again the results must be interpreted carefully as

Table 4

Total Educational Institution Costs, Tuition Fee Revenue and Net Educational Institution Costs by Program and Year

Two Year Programs

Program Year	Total Educational Institution Costs	Tuition Revenue	Net Educational Institution Costs	Tuition Fee Revenue As % of Total Educational Institution Costs
Diploma Nursing Kelsey				
1974	$1,240,942	$130,340	$1,110,602	10.5%
1975	1,550,899	124,460	1,426,439	8.0
1976	1,676,291	113,925	1,562,366	6.8
Diploma Nursing Wascana				
1974	820,350	79,625	740,725	9.7
1975	1,072,998	80,115	992,883	7.5
1976	1,258,130	73,255	1,184,875	5.8
Psychiatric Nursing				
1974	510,869	41,895	468,974	8.2
1975	599,081	35,280	563,801	5.9
1976	647,627	31,850	615,777	4.9
Dental Nursing				
1974	846,890	28,420	818,470	3.4
1975	941,494	35,280	906,214	3.7
1976	1,048,152	40,180	1,007,972	3.8
Health Record Administrator				
1974	80,101	5,880	74,221	7.3
1975	99,770	5,390	94,380	5.4
1976	99,362	5,635	93,727	5.7
All Programs				
1974	3,499,152	286,160	3,212,992	8.2
1975	4,264,242	280,525	3,983,717	6.6
1976	4,729,562	264,845	4,464,717	5.6

Table 5

Total Educational Institution Costs by Cost Component, Program and Year

One Year or Less Programs

Program Year	Direct Instructional Costs $	%	Indirect Instructional Costs $	%	Physical Plant Costs $	%	Central Department Costs $	%	Total Educational Institution Costs $	%	Percentage Change in Total Educational Institution Costs Over Previous Year
Nursing Assistant Kelsey											
1974	310,400	57.3	164,505	30.4	54,635	10.1	13,010	2.4	542,550	100.0	
1975	367,925	60.4	171,006	28.1	56,026	9.2	15,063	2.5	610,020	100.0	+12.4
1976	378,649	58.7	191,652	29.7	59,591	9.3	15,223	2.4	645,115	100.0	+5.8
Nursing Assistant Wascana											
1974	166,403	69.3	55,215	23.0	12,193	5.0	6,582	2.8	240,393	100.0	
1975	200,228	66.6	69,035	23.0	23,352	7.8	8,244	2.8	300,860	100.0	+25.2
1976	237,624	68.2	79,226	22.8	23,435	6.8	8,502	2.5	348,788	100.0	+15.9
Dental Assistant Kelsey											
1974	121,601	62.6	51,512	26.5	17,137	8.9	4,074	2.1	194,324	100.0	
1975	138,958	61.3	61,810	27.3	20,499	9.1	5,444	2.4	226,711	100.0	+16.7
1976	131,363	60.7	61,338	28.4	19,086	8.9	4,779	2.2	216,566	100.0	-4.5
Dental Assistant Wascana											
1975	85,950	54.4	40,100	25.4	28,336	18.0	3,601	2.3	157,987	100.0	
1976	196,467	65.8	60,903	20.4	35,476	11.9	5,802	2.0	298,648	100.0	+89.0
Medical Lab. Technology											
1974	178,180	68.5	58,159	22.4	19,397	7.5	4,599	1.8	260,335	100.0	
1975	226,004	67.1	78,292	23.3	25,786	7.7	6,896	2.1	336,978	100.0	+29.4
1976	238,783	69.2	76,841	22.3	23,858	6.9	6,018	1.8	345,500	100.0	+2.5
Combined Technician											
1974	62,124	72.8	16,617	19.5	5,288	6.2	1,314	1.6	85,343	100.0	
1975	103,706	67.7	35,026	22.9	11,565	7.6	3,085	2.1	153,382	100.0	+79.8
1976	108,626	65.6	41,342	25.0	12,834	7.8	3,009	1.9	165,811	100.0	+8.1
Operating Room Nursing											
1974	25,023	89.9	2,119	7.6	472	1.7	241	0.9	27,855	100.0	
1975	31,302	85.6	3,646	10.0	1,206	3.3	412	1.2	36,566	100.0	+31.3
1976	35,595	85.5	4,334	10.4	1,254	3.1	458	1.1	41,641	100.0	+13.9
All One Year or Less Programs											
1974	863,731	64.0	348,127	25.8	109,122	8.1	29,820	2.2	1,350,800	100.0	
1975	1,154,073	63.4	458,915	25.2	166,770	9.2	42,745	2.4	1,822,504	100.0	+34.9
1976	1,327,107	64.4	515,636	25.0	175,534	8.6	43,791	2.2	2,062,069	100.0	+13.2

the associated studies division at Kelsey was treated as an indirect cost. Whereas the proportion for direct costs tended to be lower at Kelsey than at Wascana, the situation was reversed for indirect costs.

As in the case of two year programs, the combination of direct and indirect instructional costs accounted for about 90 per cent of total educational institution costs. In 1976, the range was from a low of 85 per cent for dental assistant Wascana to 95 per cent for operating room nursing.

Physical plant costs accounted for approximately nine per cent of total educational institution costs. On a program basis, the range was from a low of three per cent for operating room nursing to a high of 12 per cent for dental assistant Wascana in 1976.

Central department costs accounted for about two per cent of total educational institution costs when all programs were considered together.

Total costs. The overall increase of 35 per cent between 1974 and 1975 must be interpreted with caution because a new program, dental assistant Wascana, was started in 1975. On a program basis, percentage cost increases ranged from a low of 12 per cent in the nursing assistant program Kelsey to 80 per cent in the combined technician program. Between 1975 and 1976, the overall change was a 13 per cent increase, ranging from a decrease of five per cent for dental assistant Kelsey to a high of 16 per cent for nursing assistant Wascana.

Per student costs. As shown in Table 6, the average costs of one year or less programs increased from $2,962 in 1974 to $3,231 in 1975, and to $4,242 in 1976.

Table 6

Educational Institution Per Student and Per Graduate Costs by Program and Year

One Year or Less Programs

Program	Per Student Costs				Per Graduate Costs			
	1974 $	1975 $	1976 $	Change 76/74 %	1974 $	1975 $	1976 $	Change 76/74 %
Nursing Assistant Kelsey	2,433	3,486	3,275	+34.6	2,933	3,743	3,708	+26.4
Nursing Assistant Wascana	2,453	3,270	4,254	+73.4	3,043	3,857	4,778	+57.0
Dental Assistant Kelsey	2,429	2,799	3,384	+39.3	3,036	3,779	4,246	+39.9
Dental Assistant Wascana	a	2,590	5,149	+98.8[b]	a	2,633	5,856	+122.4[b]
Medical Lab. Technology	3,063	3,404	5,235	+70.9	4,339	4,320	6,282	+44.8
Combined Technician	3,414	3,408	3,768	+10.4	5,020	4,382	4,481	-10.7
Operating Room Nursing[c]	3,979	3,657	4,627	+16.3	4,643	3,657	5,949	+28.1
Average	2,962	3,231	4,242	+43.2	3,836	3,767	5,043	+31.5

[a] This program was not in operation in 1974.

[b] Percentage change between 1975 and 1976.

[c] This program was only 18 weeks in length, about one half the length of the other programs.

On a program basis, per student costs ranged from a low of $2,429 for dental assistant Kelsey to $3,979 for operating room nursing in 1974. In 1975 the range was somewhat less: from $2,590 in dental assistant Wascana to $3,657 in operating room nursing. In 1976 the range was from $3,275 for nursing assistant Kelsey to $5,149 for dental assistant Wascana.

During the period under review, average per student costs increased by 43 per cent. However, a wide variation in cost increases existed among the programs, from a low of 10 per cent in the case of combined technician to a high of 99 per cent for dental assistant Wascana. This wide variation is largely explained by the substantial changes in enrolment which occurred in some programs during the period under review.

Per graduate costs. As presented in Table 6, average per graduate costs were $3,836, $3,767 and $5,043 for 1974, 1975 and 1976, respectively. These costs were about $900, $500 and $800 higher than the corresponding per student costs in the respective years.

Per graduate costs also ranged considerably among the programs. The widest range was found in 1976, from $3,708 for nursing assistant Kelsey to $6,282 for medical laboratory technology.

Over the three year period, average per graduate costs increased by 32 per cent which was less than the increase in per student costs. As in the case of two year programs, the level of student attrition generally declined during the period under review. While the overall increase in per graduate cuts was 32 per cent, the percentage change on a program basis varied widely: from an actual decrease of 11 per cent for combined technician to an increase of 122 per cent for dental assistant Wascana. The enrolment changes coupled with changes in attrition rates explain this wide divergence in per graduate cost changes.

Net educational institution costs. As in the case of two year programs, the proportion of total educational institution costs offset by tuition fee revenue declined during the period under review, from eight per cent in 1974 to five per cent in 1976 (Table 7). Again the implication is that net educational institution costs increased at a somewhat faster rate than did total educational institution costs.

FOREGONE EARNINGS OF STUDENTS

Basic Data and Adjustments

The basic data and adjustments used in the calculation of foregone earnings of students are summarized in Table 8. The gross foregone earnings for the grade 12 and grade 11 reference groups, as provided in Appendix G, were adjusted to take into account both unemployment rates and wages earned by students. The resulting net foregone earnings were then adjusted to derive after-tax net foregone earnings (see Appendix H).

The annual before-tax net foregone earnings of students with a grade 12 level of education were $3,821, $4,475 and $5,043 for 1974, 1975 and 1976, respectively. The corresponding after-tax net foregone earnings were $3,641, $4,389 and $4,859.

The annual net foregone earnings of students with a grade 11 level of education were substantially less than for grade 12 students. The difference in age-earnings profiles for grade 11 as compared to grade

Table 7

Total Educational Institution Costs, Tuition Fee Revenue and Net Educational Institution Costs by Program and Year

One Year or Less Programs

Program Year	Total Educational Institution Costs	Tuition Revenue	Net Educational Institution Costs	Tuition Fee Revenue As % of Total Educational Institution Costs
Nursing Assistant Kelsey				
1974	$542,550	$46,607	$495,943	8.6%
1975	610,020	36,575	573,445	6.0
1976	645,115	41,173	603,942	6.4
Nursing Assistant Wascana				
1974	240,393	20,482	219,911	8.5
1975	300,860	19,228	281,632	6.4
1976	348,788	17,138	331,650	4.9
Dental Assistant Kelsey				
1974	194,324	16,720	177,604	8.6
1975	226,711	16,929	209,782	7.5
1976	216,566	13,376	203,190	6.2
Dental Assistant Wascana				
1975	157,987	12,749	145,238	8.1
1976	298,648	12,122	286,526	4.1
Medical Lab. Technology				
1974	260,335	17,765	242,570	6.8
1975	336,978	20,691	316,287	6.1
1976	345,500	13,974	331,706	4.0
Combined Technician				
1974	85,343	5,225	80,118	6.1
1975	153,382	9,405	143,977	6.1
1976	165,811	9,196	156,615	5.5
Operating Room Nursing				
1974	27,855	693	27,162	2.5
1975	36,566	990	35,576	2.7
1976	41,641	891	40,750	2.1
All Programs				
1974	1,350,800	107,492	1,243,308	8.0
1975	1,822,504	116,567	1,705,937	6.4
1976	2,062,069	107,690	1,954,379	5.2

Table 8

Derivation of the Net Foregone Earnings of Students Using Grade 12 and Grade 11 Reference Groups by Year

Reference Group Basic Data and Adjustments	Year 1974	 1975	 1976
Grade 12 Reference Group			
Gross Foregone Earnings[a]	$4,804	$5,625	$6,421
Less Unemployment Adjustment[b]	207	242	342
Less Wages While Attending School[c]	200	234	267
Less Wages While Not Attending School[c]	576	674	769
Net Foregone Earnings	3,821	4,475	5,043
Less Income Tax[d]	180	86	184
Net Foregone Earnings After Tax	3,641	4,389	4,859
Grade 11 Reference Group			
Gross Foregone Earnings[a]	3,986	4,666	5,327
Less Unemployment Adjustment[b]	171	201	282
Less Wages While Attending School[c]	200	234	267
Less Wages While Not Attending School[c]	576	674	769
Net Foregone Earnings	3,039	3,557	4,009
Less Income Tax[d]	75	9	36
Net Foregone Earnings After Tax	2,964	3,548	3,973

[a] Represents the average income of the 15-19 and 20-24 age group as presented in Appendix G.

[b] Downward adjustments of 4.3, 4.3 and 5.3 per cent for 1974, 1975 and 1976, respectively as described in Chapter 3.

[c] See Chapter 3.

[d] See Appendix H.

12 students was a critical finding in this study because this difference affected much of the subsequent analysis. The annual before-tax net foregone earnings of grade 11 students were $3,039, $3,557 and $4,009 for 1974, 1975 and 1976, respectively. The before-tax net foregone earnings of grade 11 students, therefore, were approximately $800, $900 and $1,000 less than for the grade 12 students for the respective years. The after-tax net foregone earnings of grade 11 students were $2,964, $3,548 and $3,973 for 1974, 1975 and 1976, respectively. The differential with grade 12 students was somewhat lower than in the case of before-tax net foregone earnings.

Net Foregone Earnings by Programs

Before-tax and after-tax net foregone earnings per student by program category are presented in Table 9. The net foregone earnings of operating room nursing students were derived using salaries for registered nurses as explained in chapter 3.

The highest net foregone earnings per student, as could be expected, were for two year programs. The before-tax earnings of students for the two year period were $7,642, $8,950 and $10,086 for 1974, 1975 and 1976, respectively.

The lowest net foregone earnings existed in the case of students with a grade 11 level of education enrolled in one year programs. The before-tax net foregone earnings of these students were $3,039, $3,557 and $4,009 for 1974, 1975 and 1976, respectively.

While the operating room nursing program was only one half the length of the other one year programs, the net foregone earnings were proportionately higher than that. In fact, the before-tax net

Table 9

Net Foregone Earnings Per Student by Program and Year

Program Category Before and After Tax	Year 1974	Year 1975	Year 1976
Two Year Programs[a]			
Before Tax	$7,642	$8,950	$10,086
After Tax	7,282	8,778	9,718
One Year Programs[a]			
Before Tax	3,821	4,475	5,043
After Tax	3,641	4,389	4,859
Operating Room Nursing[b]			
Before Tax	3,416	3,848	4,703
After Tax	3,294	3,811	4,598
One Year Programs Using Grade 11 Reference Group			
Before Tax	3,039	3,557	4,009
After Tax	2,964	3,548	3,973

[a] Using a Grade 12 reference group in the 15-24 age group.

[b] Using Registered Nurses as the reference group.

foregone earnings were only $300 to $600 less than the annual before-tax net foregone earnings of grade 12 students and they were higher than for grade 11 students. The opportunity costs were higher for operating room nursing students per unit of time since they were already trained as registered nurses.

GOVERNMENT SUBSIDIES TO STUDENTS

Interest Charges on Canada Student Loans

The basic data used to derive the estimated costs of interest charges on Canada Student loans are provided in Table 10. The percentage of post-secondary students receiving loans fell from 32 per cent in 1974 to 28 per cent in 1976. The average loan award increased from $975 to $1,032 during the period. Interest rates fluctuated during the period, from 8 1/4 to 9 7/8 per cent.

Saskatchewan Student Bursaries

As indicated in Table 11, the percentage of post-secondary students receiving bursaries declined slightly between 1974 and 1976, from 23 to 22 per cent. The average bursary award, however, steadily increased during the same period, from $342 to $490.

Training Allowances

Both the total amount paid in training allowances by Canada Manpower and the average allowance per full-time trainee are presented in Table 12.

The overall average training allowance per full-time trainee rose from $2,716 in 1974 to $3,227 in 1976. Substantial variation existed among the programs. In 1976, for instance, the range was from

Table 10

Percentage of Post-Secondary Students Awarded Canada Student Loans, Average Amount of Awards, and Interest Rate on Loans by Year

	1974	1975	1976
Percentage of Post-Secondary Students Awarded Canada Student Loans	32.4%	30.6%	28.3%
Average Canada Student Loan Award	$975	$933	$1,032
Interest Rate on Loans	9%	8 1/4%	9 7/8%

Source. See Appendix B.

Table 11

Percentage of Post-Secondary Students Awarded Saskatchewan Student Bursaries and Average Amount by Award by Year

	1974	1975	1976
Percentage of Students Awarded Bursaries	23.2%	19.6%	22.1%
Average Bursary Award	$342	$455	$490

Source. See Appendix B.

Table 12

Cost of Canada Manpower Training Allowances by Program and Year

Year Data Elements	Nursing Assistant Kelsey	Nursing Assistant Wascana	Dental Assistant Kelsey	Dental Assistant Wascana	Medical Lab. Technology	Combined Technician	All Programs
1974							
Total Cost of Allowances[a]	$131,716	$75,112	$42,870	c	$23,594	$ 8,581	$247,181
Number of Trainees[b]	40(13)	22(11)	17(8)		9(1)	3(1)	91
Average Cost Per Full-Time Trainee	$ 2,966	$ 2,730	$ 2,199		$ 2,611	$ 2,537	$ 2,716
1975							
Total Cost of Allowances[a]	$ 58,073	$76,039	$43,276	$23,218	$36,207	$32,485	$244,847
Number of Trainees[b]	20(2)	21(9)	17(5)	8(0)	12(4)	11(3)	89
Average Cost Per Full-Time Trainee	$ 2,797	$ 3,040	$ 2,286	$ 2,903	$ 2,647	$ 2,844	$ 2,751
1976							
Total Cost of Allowances[a]	$179,522	$65,532	$42,907	$38,132	$32,147	$34,640	$358,179
Number of Trainees[b]	51(6)	17(5)	11(5)	10(3)	11(2)	11(3)	111
Average Cost Per Full-Time Trainee	$ 3,364	$ 3,257	$ 3,123	$ 3,502	$ 2,836	$ 2,789	$ 3,227

[a] Includes costs of travel, commuting, living away from home, and regular allowances.

[b] Number of trainees supported for the entire course is presented first. The number of trainees supported for only part of the course is shown in parentheses.

[c] This program was not in operation in 1974.

$2,789 per full-time trainee in the combined technician program to $3,502 in the dental assistant program at Wascana.

STUDENT EDUCATIONAL COSTS

As evident from Table 13, student educational costs for two year programs were $868, $908, and $936 for 1974, 1975 and 1976, respectively. With respect to one year programs, student educational costs were $398, $418 and $432 for the corresponding years. The corresponding costs for operating room nursing were $194, $204 and $211.

Since tuition fees and student association fees did not change during the period under review, the entire cost increases were due to the costs of books and supplies. The estimated expenses for books and supplies increased by $33, $66 and $77 for two year programs, one year programs and operating room nursing, respectively.

IMPUTED COSTS OF INTEREST ON PHYSICAL PLANT AND OF PROPERTY TAX EXEMPTIONS

Table 14 presents the imputed costs of foregone interest on investment in the physical plant and of property tax exemptions by program and year.

On a program basis imputed interest ranged from $1,302 to $108,445 in 1974, from $1,735 to $108,909 in 1975 and from $1,757 to $112,102 in 1976. In each year operating room nursing had the lowest cost and diploma nursing Kelsey had the highest cost.

The estimated value of property tax exemptions on a program basis ranged from $198 to $39,631 in 1974, from $300 to $44,328 in 1975, and from $360 to $49,065 in 1976. Again operating room nursing consistently had the lowest cost and diploma nursing Kelsey always had the highest cost.

Table 13

Student Costs for Fees and Other Educational Expenses by Program and Year

Cost Component	Year 1974	 1975	 1976
Tuition Fees			
Two Year Programs	$245/Year	$245/Year	$245/Year
One Year Programs	$209	$209	$209
Operating Room Nursing	$ 99	$ 99	$ 99
Student Association Fee	$25/Year	$25/Year	$25/Year
Other Ed. Expenses	$164/Year	$184[a]/Year	$197[a]/Year
Totals			
Two Year Programs	$868	$908	$936
One Year Programs	$398	$418	$432
Operating Room Nursing	$194	$204	$211

Source. See Chapter 3.

[a] These costs were derived by applying the consumer price index for Recreation, Education and Reading to the 1974 base figure. Application of the index revealed costs of $184 and $197 for Kelsey in 1975 and 1976, respectively (the corresponding costs for Wascana were $183 and $199).

Table 14

Imputed Costs of Foregone Interest on Investment in Physical Plant and of Property Tax Exemptions by Program and Year

	Diploma Nursing Kelsey	Diploma Nursing Wascana	Psychiatric Nursing	Dental Nursing	Health Record Administrator	Nursing Assistant Kelsey	Nursing Assistant Wascana	Dental Assistant Kelsey	Dental Assistant Wascana	Medical Laboratory Technology	Combined Technician	Operating Room Nursing
	$	$	$	$	$	$	$	$	$	$	$	$
1974												
Interest on Buildings	108,445	110,131	63,267	89,269	7,158	48,185	33,632	15,113	a	17,107	4,664	1,302
Property Tax Exemptions	39,631	16,752	9,624	16,710	1,088	17,609	5,116	5,523		6,252	1,704	198
Total	148,076	126,883	72,891	105,979	8,246	65,794	38,794	20,636		23,359	6,368	1,500
1975												
Interest on Buildings	108,909	117,000	54,523	132,607	8,243	41,625	33,619	15,229	40,487	19,158	8,592	1,735
Property Tax Exemptions	44,328	20,227	9,427	26,810	1,425	16,942	5,819	6,199	8,186	7,798	3,497	300
Total	153,237	137,227	63,950	159,417	9,668	58,567	39,438	21,428	48,673	26,956	12,089	2,035
1976												
Interest on Buildings	112,102	119,106	51,854	127,431	7,889	42,050	32,838	13,469	47,324	16,836	9,056	1,757
Property Tax Exemptions	49,065	24,395	10,621	26,122	1,616	18,405	6,725	5,895	9,701	7,369	3,964	360
Total	161,167	143,501	62,475	153,553	9,505	60,455	39,563	19,364	57,025	24,205	13,020	2,117

Source. See Chapter 3.

[a] This program was not in operation in 1974.

SOCIAL COSTS OF HEALTH PERSONNEL TRAINING

The social costs of training for two year programs and for one year or less programs are presented separately.

Two Year Programs

As evident in Table 15, total social costs of two year health personnel training programs increased from $8.8 million to $11.1 million between 1974 and 1976. On a per student basis, as shown in Table 16, the average costs were $16,565, $19,349, and $21,286 for 1974, 1975 and 1976, respectively. Between 1974 and 1976, therefore, average social costs per student increased by 29 per cent.

Substantial variation existed in all years in per student social costs among the two year programs (Table 16). Dental nursing consistently had the highest per student costs, but they remained virtually constant throughout the period at approximately $25,000 per student. Diploma nursing Kelsey consistently had the lowest per student costs: $13,453, $16,348, and $18,721 for 1974, 1975 and 1976, respectively.

The proportional distribution of social costs remained fairly constant during the period under review. Looking at all programs (Table 15), net educational institution costs accounted for between 37 and 40 per cent of total social costs. The largest cost component was net foregone earnings which accounted for between 49 and 51 per cent of social costs. Taken together, net educational institution costs and net foregone earnings accounted for 88 per cent, 89 per cent and 89 per cent of total social costs in 1974, 1975 and 1976, respectively. Student educational costs accounted for between four and six per cent of total

Table 15

Total Social Costs of Health Personnel Training by Program and Year

Two Year Programs

Year Cost Component	Diploma Nursing Kelsey		Diploma Nursing Wascana		Psychiatric Nursing		Dental Nursing		Health Record Administrator		All Programs	
	$	%	$	%	$	%	$	%	$	%	$	%
1974												
1. Net Ed. Institution Costs	1,110,602	31.0	740,725	32.4	468,974	36.4	818,470	57.2	74,221	39.6	3,212,992	36.6
2. Net Foregone Earnings	2,032,772	56.8	1,241,825	54.3	653,391	50.7	443,236	31.0	91,704	49.0	4,462,928	50.9
3. Student Educational Costs	230,888	6.5	141,050	6.2	74,214	5.7	50,344	3.5	10,416	5.6	506,912	5.8
4. Gov't Subsidies to Students	56,078	1.6	34,519	1.5	18,185	1.4	12,231	0.9	2,530	1.4	123,543	1.4
5. Imputed Costs	148,076	4.1	126,883	5.6	72,891	5.6	105,979	7.4	8,246	4.4	462,075	5.3
Total	3,578,416	100.0	2,285,002	100.0	1,287,655	100.0	1,430,260	100.0	187,117	100.0	8,768,450	100.0
1975												
1. Net Ed. Institution Costs	1,426,439	34.4	992,883	35.7	563,801	41.6	906,214	50.5	94,380	43.8	3,983,717	38.7
2. Net Foregone Earnings	2,273,300	54.8	1,463,325	52.5	644,400	47.5	644,400	35.9	98,450	45.7	5,123,875	49.8
3. Student Educational Costs	230,632	5.6	148,131	5.4	65,232	4.8	65,232	3.7	9,966	4.7	519,193	5.1
4. Gov't Subsidies to Students	68,830	1.7	44,371	1.6	19,812	1.5	19,512	1.1	2,984	1.4	155,509	1.5
5. Imputed Costs	153,237	3.7	137,227	5.0	63,950	4.8	159,417	8.9	9,668	4.5	523,499	5.1
Total	4,152,438	100.0	2,785,937	100.0	1,357,195	100.0	1,794,775	100.0	215,448	100.0	10,305,793	100.0
1976												
1. Net Ed. Institution Costs	1,562,366	35.9	1,184,875	39.3	615,777	43.6	1,007,972	48.3	93,727	40.2	4,464,717	40.2
2. Net Foregone Earnings	2,344,995	53.9	1,507,857	50.0	655,590	46.4	827,052	39.6	115,989	49.8	5,451,483	49.1
3. Student Educational Costs	217,155	5.0	140,231	4.7	60,970	4.4	76,916	3.7	10,787	4.7	506,059	4.6
4. Gov't Subsidies to Students	66,854	1.6	43,310	1.5	18,690	1.4	23,581	1.2	3,310	1.5	155,745	1.4
5. Inputed Costs	161,167	3.7	143,501	4.8	62,475	4.5	153,553	7.4	9,505	4.1	530,201	4.8
Total	4,352,537	100.0	3,019,774	100.0	1,413,502	100.0	2,089,074	100.0	233,318	100.0	11,108,205	100.0

Note. The totals may not be exact due to rounding.

Table 16

Per Student Social Costs of Health Personnel Training by Program and Year

Two Year Programs

Year Cost Component	Diploma Nursing Kelsey $	Diploma Nursing Wascana $	Psychiatric Nursing $	Dental Nursing $	Health Record Administrator $	Average of All Two Year Programs $
1974						
1. Net Ed. Institution Costs	4,175	4,559	5,486	14,112	6,185	6,903
2. Net Foregone Earnings	7,642	7,642	7,642	7,642	7,642	7,642
3. Student Educational Costs	868	868	868	868	868	868
4. Gov't Subsidies to Students	211	211	211	211	211	211
5. Imputed Costs	557	782	853	1,827	687	941
Total	13,453	14,062	15,060	24,660	15,593	16,565
1975						
1. Net Ed. Institution Costs	5,616	6,073	7,831	12,586	8,580	8,137
2. Net Foregone Earnings	8,950	8,950	8,950	8,950	8,950	8,950
3. Student Educational Costs	908	906	906	906	906	906
4. Gov't Subsidies to Students	271	271	271	271	271	271
5. Imputed Costs	603	839	888	2,214	879	1,085
Total	16,348	17,039	18,846	24,927	19,586	19,349
1976						
1. Net Ed. Institution Costs	6,720	7,927	9,473	12,292	8,150	8,912
2. Net Foregone Earnings	10,086	10,086	10,086	10,086	10,086	10,086
3. Student Educational Costs	934	938	938	938	938	938
4. Gov't Subsidies to Students	287	287	287	287	287	287
5. Imputed Costs	693	961	962	1,874	828	1,063
Total	18,721	20,199	21,745	25,477	20,289	21,286

social costs. Government subsidies to students and imputed costs of interest and property tax exemptions accounted for one and five per cent, respectively.

However, there was a substantial difference in the distribution of total social costs among the programs. For example, in 1974, the proportion attributable to net educational institution costs ranged from a low of 31 per cent in diploma nursing Kelsey to 57 per cent in dental nursing. With respect to net foregone earnings, the exact opposite situation existed (Table 15).

Per graduate social costs were considerably higher than per student social costs. The overall average per graduate costs were $20,473, $23,452 and $24,726 for 1974, 1975 and 1976, respectively (Table 17). The corresponding per student social costs were $16,565, $19,349 and $21,286 (Table 16). The cost differentials were $3,908 in 1974, $4,103 in 1975 and $3,440 in 1976.

Per graduate social costs varied substantially, but consistently diploma nursing Kelsey had the lowest cost and dental nursing had the highest cost. The range was from $15,082 to $26,386 in 1974, from $18,285 to $27,250 in 1975, and from $21,404 to $28,423 in 1976 (Table 17).

A comparison of the two diploma nursing programs revealed that both per student and per graduate costs were consistently higher at Wascana than at Kelsey (Tables 16 and 17). Most of the cost differential was due to net educational institution costs. Moreover, the difference in net educational institution costs grew during the period under review. Whereas the per student cost difference was $384 in 1974, it was $1,207 in 1976. On a per graduate basis the differential increased from $931 in 1974 to $1,137 in 1976.

Table 17

Per Graduate Social Costs of Health Personnel Training by Program and Year

Two Year Programs

Year Cost Component	Diploma Nursing Kelsey $	Diploma Nursing Wascana $	Psychiatric Nursing $	Dental Nursing $	Health Record Administrator $	Average of All Two Year Programs $
1974						
1. Net Ed. Institution Costs	4,946	5,877	10,069	15,318	8,833	9,009
2. Net Foregone Earnings	8,308	8,691	10,669	7,963	9,216	8,969
3. Student Educational Costs	944	987	1,215	905	1,047	1,020
4. Gov't Subsidies to Students	230	242	298	219	254	248
5. Imputed Costs	654	995	1,535	1,981	970	1,227
Total	15,082	16,792	23,786	26,386	20,320	20,473
1975						
1. Net Ed. Institution Costs	6,600	7,825	12,821	13,969	11,176	10,478
2. Net Foregone Earnings	9,702	10,192	11,716	9,432	10,267	10,262
3. Student Educational Costs	984	1,032	1,186	954	1,039	1,039
4. Gov't Subsidies to Students	294	309	360	286	311	312
5. Imputed Costs	705	1,072	1,437	2,452	1,137	1,361
Total	18,285	20,430	27,520	27,093	23,930	23,452
1976						
1. Net Ed. Institution Costs	8,124	9,261	13,054	14,133	9,917	10,898
2. Net Foregone Earnings	11,103	10,911	11,944	10,827	11,148	11,188
3. Student Educational Costs	1,028	1,014	1,111	1,007	1,037	1,039
4. Gov't Subsidies to Students	316	313	340	309	318	319
5. Imputed Costs	833	1,117	1,315	2,147	1,001	1,283
Total	21,404	22,616	27,764	28,423	23,421	24,726

One Year or Less Programs

As presented in Table 18, the total social costs of health personnel training in the one year or less programs rose from $3.9 million in 1974 to $5.5 million in 1976. The average per student costs were $7,695, $8,764 and $10,630 for 1974, 1975 and 1976, respectively (Table 19). Between 1974 and 1976, therefore, per student costs increased by 38 per cent.

Considerable variation in per student costs existed among the programs. (However, the variation was less than in the case of two year programs.) In 1974, the per student costs ranged from $7,434 for nursing assistant Kelsey to $8,127 for combined technician. The costs ranged from $7,948 for operating room nursing to $9,344 for nursing assistant Wascana in 1975. (Again it should be noted that the operating room nursing program was only about one half the length of the other programs.) The range in 1976 was from $9,770 for dental assistant Kelsey to $12,201 for dental assistant Wascana (Table 19).

When the grade 11 reference group was used for the nursing assistant and dental assistant programs, the net foregone earnings, and accordingly total social costs, declined substantially (see Appendix L). For instance, in 1976 the per student social cost of nursing assistant Kelsey was $8,870 using a grade 11 reference group as opposed to $9,904 using a grade 12 reference group.

The distribution of social costs changed very little during the period under review. The largest component was net foregone earnings which on the average accounted for 51 per cent, 50 per cent and 48 per cent of total social costs in 1974, 1975 and 1976, respectively (Table 18).

Table 18

Social Costs of Health Personnel Training by Program and Year

One Year or Less Programs

Year Cost Component	Nursing Assistant Kelsey[a]		Nursing Assistant Wascana[a]		Dental Assistant Kelsey[a]		Dental Assistant Wascana[a]		Medical Lab. Technology		Combined Technician		Operating Room Nursing		All Programs	
	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
1974																
1. Net Ed. Inst. Costs	495,943	30.0	219,911	29.1	177,604	30.3			242,570	37.0	80,118	39.5	27,162	49.7	1,243,308	31.8
2. Net Foregone Earnings	852,083	51.4	374,458	49.5	305,680	52.1			324,785	49.5	95,525	47.1	23,912	43.8	1,976,443	50.3
3. Student Ed. Costs	88,754	5.4	39,004	5.2	31,840	5.5	b		33,830	5.2	9,950	4.9	1,355	2.5	204,733	5.3
4. Gov't Subsidies to Students	155,223	9.4	85,444	11.3	51,303	8.8			32,553	5.0	11,217	5.6	740	1.4	336,480	8.6
5. Imputed Costs	65,794	4.0	38,748	5.2	20,636	3.6			23,359	3.6	6,368	3.2	1,500	2.8	156,405	4.0
Total	1,657,797	100.0	757,565	100.0	587,063	100.0			657,097	100.0	203,178	100.0	54,669	100.0	3,917,369	100.0
1975																
1. Net Ed. Inst. Costs	573,405	36.6	281,632	32.8	209,782	30.8	145,238	27.8	316,287	36.1	143,977	34.8	35,576	44.8	1,705,897	34.1
2. Net Foregone Earnings	783,125	49.9	411,700	47.9	362,475	53.2	272,975	52.2	443,025	50.5	201,375	48.6	38,480	48.5	2,513,155	50.2
3. Student Ed. Costs	72,975	4.7	38,364	4.5	33,777	5.0	25,437	4.9	41,283	4.7	18,765	4.6	2,030	2.6	232,631	4.7
4. Gov't Subsidies to Students	81,783	5.2	88,506	10.3	54,415	8.0	31,487	6.1	49,628	5.7	38,581	9.3	1,355	1.7	345,755	6.9
5. Imputed Costs	58,567	3.8	39,438	4.6	21,428	3.2	48,673	9.3	26,956	3.1	12,089	3.0	2,035	2.6	209,186	4.2
Total	1,569,855	100.0	859,640	100.0	681,877	100.0	523,810	100.0	877,179	100.0	414,787	100.0	79,476	100.0	5,006,624	100.0
1976																
1. Net Ed. Inst. Costs	603,942	31.0	331,650	37.0	203,190	32.5	286,526	40.5	331,706	43.7	156,615	34.7	40,750	46.1	1,954,379	35.7
2. Net Foregone Earnings	993,471	51.0	413,526	46.1	322,752	51.7	292,494	41.4	332,838	43.9	221,892	49.2	42,327	47.9	2,619,300	47.8
3. Student Ed. Costs	85,301	4.4	35,506	4.0	27,712	4.5	25,114	3.6	28,578	3.8	19,052	4.3	1,899	2.2	223,162	4.1
4. Gov't Subsidies to Students	207,849	10.7	77,325	8.7	52,208	8.4	46,473	6.6	42,031	5.6	40,966	9.1	1,295	1.5	468,147	8.6
5. Imputed Costs	60,455	3.1	39,563	4.4	19,364	3.1	57,025	8.1	24,205	3.2	13,020	2.9	2,117	2.4	215,749	4.0
Total	1,951,018	100.0	897,570	100.0	625,226	100.0	707,632	100.0	759,358	100.0	451,545	100.0	88,388	100.0	5,480,737	100.0

Note. The totals may not be exact due to rounding.

[a] Social costs using a Grade 11 reference group are provided in Appendix L.

[b] This program was not in operation in 1974.

Table 19

Per Student Social Costs of Health Personnel Training by Program and Year

One Year or Less Programs

	Year Cost Component	Nursing Assistant Kelsey $	Nursing Assistant Wascana $	Dental Assistant Kelsey $	Dental Assistant Wascana $	Medical Lab. Technology $	Combined Technician $	Operating Room Nursing $	Average of All One Year Programs $
1974									
1.	Net Ed. Institution Costs	2,224	2,244	2,220		2,854	3,205	3,880	2,771
2.	Net Foregone Earnings	3,821	3,821	3,821		3,821	3,821	3,416	3,754
3.	Student Educational Costs	398	398	398	a	398	398	194	364
4.	Gov't Subsidies to Students	696	872	641		383	448	106	524
5.	Imputed Costs	295	395	258		275	255	214	282
	Total	7,434	7,730	7,338		7,731	8,127	7,810	7,695
1975									
1.	Net Ed. Institution Costs	3,277	3,061	2,590	2,381	3,195	3,199	3,558	3,037
2.	Net Foregone Earnings	4,475	4,475	4,475	4,475	4,475	4,475	3,848	4,385
3.	Student Educational Costs	417	417	417	417	417	417	203	386
4.	Gov't Subsidies to Students	468	962	672	516	502	859	136	588
5.	Imputed Costs	335	429	265	798	273	269	204	368
	Total	8,971	9,344	8,419	8,587	8,860	9,218	7,948	8,764
1976									
1.	Net Ed. Institution Costs	3,066	4,045	3,175	4,940	5,026	3,559	4,528	4,048
2.	Net Foregone Earnings	5,043	5,043	5,043	5,043	5,043	5,043	4,703	4,994
3.	Student Educational Costs	433	433	433	433	433	433	211	401
4.	Gov't Subsidies to Students	1,055	943	815	801	637	931	144	761
5.	Imputed Costs	307	482	302	983	367	296	235	425
	Total	9,904	10,946	9,770	12,201	11,505	10,262	9,821	10,630

[a] This program was not in operation in 1974.

The second largest component, net educational institution costs, accounted for 32 per cent, 34 per cent and 36 per cent of total social costs in the same years. Taken together, net educational institution costs and net foregone earnings accounted for between 82 and 84 per cent of total social costs in each year. Student educational costs accounted for between 4 and 5 per cent of social costs. The proportion attributable to government subsidies to students and to imputed costs remained constant at 7 and 4 per cent, respectively (Table 18).

Several variations in the distribution of total social costs can be noted among the programs in Table 18. The most pronounced variation, though, existed with respect to net educational institution costs. In 1974, for example, the proportion of total social costs attributable to net educational institution costs ranged from a low of 29 per cent in nursing assistant Wascana to 50 per cent in operating room nursing.

As in the case of two year programs, per graduate costs were substantially higher than per student costs. Average per graduate costs, as shown in Table 20, were $9,957, $10,256 and $12,612 in 1974, 1975 and 1976, respectively. The corresponding per student costs were $7,695, $8,764 and $10,630 (Table 19). The cost differentials, therefore, were $2,262, $1,492 and $1,982 for the respective years.

Per graduate costs also varied considerably: from $8,961 in nursing assistant Kelsey to $11,952 in combined technician in 1974, from $7,948 in operating room nursing to $11,851 in combined technician in 1975, and from $11,213 in nursing assistant Kelsey to $13,875 in dental assistant Wascana in 1976.

A comparison of the duplicated programs (nursing assistant and dental assistant) revealed that the Wascana programs generally had

Table 20

Per Graduate Social Costs of Health Personnel Training by Program and Year

One Year or Less Programs

Year Cost Component	Nursing Assistant Kelsey $	Nursing Assistant Wascana $	Dental Assistant Kelsey $	Dental Assistant Wascana $	Medical Lab. Technology $	Combined Technician $	Operating Room Nursing $	Average of All One Year Programs $
1974								
1. Net Ed. Institution Costs	2,681	2,784	2,775		4,043	4,713	4,527	3,587
2. Net Foregone Earnings	4,606	4,740	4,776		5,413	5,619	3,985	4,857
3. Students Educational Costs	480	494	497	[a]	564	585	226	474
4. Gov't Subsidies to Students	839	1,082	802		543	660	123	675
5. Imputed Costs	356	490	322		389	374	250	364
Total	8,961	9,589	9,173		10,952	11,952	9,112	9,957
1975								
1. Net Ed. Institution Costs	3,518	3,611	3,496	2,421	4,055	4,114	3,558	3,540
2. Net Foregone Earnings	4,805	5,278	6,041	4,550	5,680	5,754	3,848	5,137
3. Students Educational Costs	448	492	563	424	529	536	203	456
4. Gov't Subsidies to Students	502	1,135	907	525	636	1,102	136	706
5. Imputed Costs	360	506	357	811	346	345	204	418
Total	9,631	11,021	11,365	8,730	11,246	11,851	7,948	10,256
1976								
1. Net Ed. Institution Costs	3,471	4,543	3,984	5,618	6,031	4,233	5,821	4,814
2. Net Foregone Earnings	5,710	5,665	6,328	5,735	6,052	5,997	6,047	5,933
3. Students Educational Costs	490	486	543	492	520	515	271	474
4. Gov't Subsidies to Students	1,195	1,059	1,023	911	764	1,107	185	892
5. Imputed Costs	347	542	380	1,118	440	352	302	497
Total	11,213	12,295	12,260	13,875	13,807	12,204	12,627	12,612

[a] This program was not in operation in 1974.

higher per student and per graduate costs than did the Kelsey programs. In the case of the nursing assistant programs, the per student cost differentials were $296, $373 and $1,042 for 1974, 1975 and 1976, respectively. The per graduate cost differentials were $628, $1,390 and $1,082 for the same years. The per student cost differential for the dental assistant programs amounted to $168 in 1975 and $2,431 in 1976. With respect to per graduate costs, the Wascana program had a substantially lower cost than the Kelsey program in 1975 (a $2,635 cost differential), but in 1976 the situation was reversed (with a $1,615 cost differential).

PRIVATE COSTS OF HEALTH PERSONNEL TRAINING

The private costs of training consisted of tuition fees, other educational costs (student association fees, educational books and supplies), and net foregone earnings after tax. Three program categories and three types of students were distinguished in the calculation of private costs.

Two Year Programs

Self-supporting students. As evident from Table 21, the private costs for self-supporting students in two year programs were $8,150, $9,684 and $10,656 in 1974, 1975 and 1976, respectively. Private costs increased by 31 per cent during the period. The entire increase was essentially due to increased net foregone earnings since fees remained constant and books and supplies rose only slightly (books and supplies increased by $66).

Bursary recipients. The private costs for bursary recipients were $7,466, $8,774 and $9,676 in 1974, 1975 and 1976, respectively (Table 21). Costs increased by 30 per cent which was slightly less than

Table 21

The Private Costs of Health Personnel Training
by Program Category, Type of Student and Year

Program Category Type of Student	Year 1974	 1975	 1976
Two Year Programs			
Self-Supporting Student	$8,150	$9,684	$10,656
Bursary Recipient	7,466	8,774	9,676
One Year Programs			
(a) Using Grade 12 Reference Group			
Self-Supporting Student	4,039	4,806	5,292
Bursary Recipient	3,697	4,351	4,802
Allowance Recipient	925	1,638	1,632
(b) Using Grade 11 Reference Group			
Self-Supporting Student	3,362	3,966	4,404
Bursary Recipient	3,020	3,511	3,914
Allowance Recipient	248	797	746
Operating Room Nursing			
Self-Supporting Student	3,488	4,014	4,809
Bursary Recipient	3,317	3,786	4,564

the situation for self-supporting students. The explanation was that the average bursary award increased at a somewhat faster rate than did the rise in total private costs. However, it is also noteworthy that the average bursary award constituted between only nine and ten per cent of total private costs during the period under review.

One Year Programs

Self-supporting students. The private costs for self-supporting students with a grade 12 level of education were $4,039, $4,806 and $5,292 in 1974, 1975 and 1976, respectively (Table 21). An increase of 31 per cent, essentially attributable to increased foregone earnings, occurred between 1974 and 1976.

In the case of the nursing assistant and dental assistant programs, self-supporting students with a grade 11 level of education had private costs of $3,362, $3,966 and $4,444 for 1974, 1975 and 1976, respectively. The lower value of foregone earnings resulted in much reduced private costs for persons with a grade 11 versus grade 12 level of education. The cost differentials were $677, $840 and $888 for 1974, 1975 and 1976, respectively.

Bursary recipients. The private costs to bursary recipients with a grade 12 level of education were $3,697, $4,351 and $4,802 in 1974, 1975 and 1976, respectively (Table 21). The increase of 30 per cent during the period was again evidence that the average bursary award rose slightly faster than the total private costs during the period under review. But again it is noteworthy that the average bursary award represented only nine per cent of total private costs.

In regard to the nursing assistant and dental assistant programs, the private costs to bursary recipients using a grade 11 reference group were $3,020, $3,511 and $3,914 in 1974, 1975 and 1976, respectively (Table 21).

Allowance recipients. As shown in Table 21, the private costs to allowance recipients with a grade 12 level of education were $925, $1,638 and $1,632 in 1974, 1975 and 1976, respectively. While these costs were substantially below the costs to either self-supporting students or bursary recipients, the allowance rates did not keep pace with total private costs. The private costs to allowance recipients increased by 76 per cent during the three year period.

In the case of allowance recipients with a grade 11 level of education in the nursing assistant and dental assistant programs, private costs were $248, $797 and $746 in 1974, 1975 and 1976, respectively. The failure of the allowance rates to keep pace with rising total private costs was very evident; the private costs increased by 201 per cent for allowance recipients.

Operating Room Nursing

Self-supporting students. The private costs for self-supporting students were $3,488, $4,014 and $4,809 in 1974, 1975 and 1976, respectively. In effect, private costs increased by 38 per cent during the three year period (Table 21).

Bursary recipients. As also shown in Table 21, the private costs to bursary recipients were $3,317, $3,786 and $4,564 in 1974, 1975 and 1976, respectively. During the three year period there was a 38 per cent increase in costs, matching the situation for self-supporting students.

SUMMARY OF CHAPTER 5

This chapter has presented the findings of the study regarding the costs of health personnel training.

Costs were first reported in terms of the five major cost components used in this study. The total of all the cost components, with the necessary adjustments to avoid double counting, constituted social costs.

The analysis of social costs revealed that the largest single component was net foregone earnings of students which represented approximately one half of total social costs. Net educational institution costs constituted the second largest component, representing between 32 and 40 per cent of total social costs. Together net foregone earnings and net educational institution costs accounted for between 82 and 89 per cent of total social costs. Student educational costs represented between four and six per cent of social costs. Government subsidies to students accounted for about one per cent of social costs in the case of two year programs, but for seven to nine per cent in the case of one year programs. The imputed costs pertaining to interest on physical plant and property tax exemptions represented approximately five per cent of total social costs.

Social costs were also presented in terms of per student and per graduate costs. The average per student costs in two year programs were $16,000, $19,000 and $21,000 in 1974, 1975 and 1976, respectively (rounded to nearest thousand). The corresponding per graduate costs were substantially higher: $20,000, $23,000 and $25,000. The cost differentials, therefore, were between $3,000 and $4,000. For one year programs, average per student costs were $8,000, $9,000 and $10,000 in

1974, 1975 and 1976, respectively. The corresponding per graduate costs were $10,000, $10,000 and $13,000. The cost differentials, therefore, were between $1,000 and $3,000.

Private costs of training to self-supporting students in two year programs were $8,100, $9,700 and $10,700 in 1974, 1975 and 1976, respectively (rounded to nearest hundred). The corresponding costs for bursary recipients were between $700 and $1,000 less in each case. For one year programs, the costs to self-supporting students were $4,000 $4,800 and $5,300 for the same three years. Costs to bursary recipients were between $300 and $500 less in each year. The private costs to allowance recipients were considerably less, being $900, $1,600 and $1,600 for 1974, 1975 and 1976, respectively. Private costs of training to self-supporting students in the operating room nursing program were $3,500, $4,000 and $4,800 for 1974, 1975 and 1976, respectively. The corresponding costs for bursary recipients were $3,300, $3,800 and $4,600. Using a grade 11 reference group for the nursing and dental assistant programs resulted in greatly reduced private costs; for example, the cost to self-supporting students in 1976 was $3,400 as compared to $4,000 with a grade 12 reference group.

The analysis of private costs also revealed that the average bursary award increased at a slightly faster rate than did total private costs. However, the bursary award constituted only nine per cent of total private costs. While the training allowance covered a large part of private costs (61 per cent in 1976), the allowances failed to keep pace with the rising private costs (in 1974 allowances accounted for 67 per cent of private costs).

Chapter 6

THE EARNINGS PROFILES FOR HEALTH PERSONNEL AND THEIR REFERENCE GROUPS

Monetary benefits in this study were determined by estimating the difference in earnings between health personnel and their reference groups. The estimation of earnings differentials entailed an analysis of the basic earnings and labour force activity patterns of both health personnel and their reference groups. The results of this analysis were then used to construct lifetime earnings profiles.

BASIC EARNINGS OF HEALTH PERSONNEL AND THEIR REFERENCE GROUPS

Health Personnel Classifications

The basic annual before-tax earnings for the health personnel groups are presented in Table 22. Examples of the corresponding after-tax earnings are contained in Appendix H.

There was a substantial range in the basic salaries among the health personnel groups included in this study. Focusing on starting salaries, dental nurses had the highest salaries in all years. At the other extreme were medical laboratory technologists. However, the first year of earnings for medical laboratory technologists was the hospital internship period. Excluding medical laboratory technologists, the lowest salary existed in the case of certified dental assistants in all years of the study. The range of starting salaries, was from a low of

Table 22

Annual Before-Tax Earnings of Health Personnel by Health Personnel Classification and Year

Health Personnel Classification Year	Steps in Salary Scale 1	2	3	4	5	6	7	Percentage Change in Maximum Salary 76/74
Registered Nurse								
1974	$ 8,484	$ 8,784	$ 9,108	$ 9,444	$ 9,960			
1975	9,576	9,888	10,260	10,692	11,124			
1976	11,700	12,084	12,540	13,020	13,620			+36.8%
Registered Psychiatric Nurse [a]								
1974	7,860	8,244	8,664	9,564	10,044	10,524	11,052	
1975	9,096	9,504	9,960	10,908	11,424	11,940	12,504	
1976	11,472	11,880	12,348	13,320	13,836	14,364	14,940	+35.2
Dental Nurse [a]								
1974	9,096	9,564	10,044	10,524	11,052			
1975	10,320	10,824	11,352	11,880	12,444			
1976	12,420	12,972	13,524	14,100	14,724			+33.3
Health Record Administrator								
1974	7,824	8,172	8,544					
1975	8,772	9,168	9,588					
1976	11,520	11,988	12,468					+46.0
Certified Nursing Assistant								
1974	6,864	7,176	7,488					
1975	7,836	8,172	8,532					
1976	10,440	10,836	11,244					+50.2
Certified Dental Assistant [a]								
1974	5,856	6,144	6,456	6,780	7,116	7,476		
1975	6,792	7,116	7,440	7,800	8,172	8,556		
1976	8,640	8,988	9,336	9,720	10,116	10,536		+41.0
Medical Lab. Technologist								
1974	3,120	8,604	8,700	8,964	9,360	9,696	10,128	
1975	3,120	9,528	9,780	10,068	10,524	10,572	11,040	
1976	7,908	11,568	11,856	12,168	12,672	12,720	13,476	+33.1
Certified Combined Technician								
1974	6,864	7,176	7,488					
1975	7,836	8,172	8,532					
1976	10,440	10,836	11,244					+50.2
Operating Room Nursing								
1974	8,564	8,904	9,228	9,564	10,080			
1975	9,696	10,008	10,380	10,812	11,244			
1976	11,820	12,204	12,660	13,140	13,740			+36.3

Source. Salary scales from collective bargaining agreements.

[a] A weighted salary scale was derived from the two salary scales which were in effect during the year. One scale existed for the first nine months and the second was in place for the last three months.

$5,856, to $9,096 in 1974, from $6,792 to $10,320 in 1975, and from $8,640 to $12,420 in 1976. Using maximum salaries, again dental nurses and certified dental assistants consistently had the highest and lowest salaries, respectively. An exception existed in 1975 when the salaries for certified nursing assistants and combined technicians were slightly lower than for those for certified dental assistants. The range in maximum salaries was from $7,476 to $11,052 in 1974, from $8,532 to $12,444 in 1975, and from $10,536 to $14,724 in 1976.

Another observation regarding the basic earnings data in Table 22 was that the number of steps in the salary grids differed considerably. Only three steps existed for health record administrators, certified nursing assistants and certified combined technicians. At the other extreme, seven steps existed for registered psychiatric nurses and medical laboratory technologists.

A final observation concerning the basic earnings data was that the percentage increase during the period under review ranged from 33 per cent for medical laboratory technologists and dental nurses to 50 per cent for certified nursing assistants and certified combined technicians. The average increase in wages and salaries for all classes of workers in Saskatchewan covered by the Industrial Composite Index, as reported in Appendix F, was 34 per cent during the same period. Thus, the salaries for the health personnel groups included in this study generally increased at a faster rate than did the overall provincial average. Moreover, the percentage increases in Table 22 were based on maximum salaries. Using starting or mid scale salaries, the increases were even higher in some groups and in no case were they lower than using maximum salaries.

Reference Groups

Three reference groups were used in this study: persons with a grade 12 level of education, persons with a grade 11 level of education, and registered nurses.

Grade 12 and 11 reference groups. The estimated before-tax annual earnings for the grade 12 and grade 11 reference groups are reported in Table 23. (A sample of the corresponding after-tax earnings is contained in Appendix H.) These data represented the average employment income of Saskatchewan females with a grade 12 level of education who worked as wage earners on a full-time, full-year basis.

As noted earlier in this study, the age-earnings were considerably less for the grade 11 than for the grade 12 reference group. For example, for the 45 to 54 age category in 1976, the average earnings of persons with grade 11 were \$7,959 as compared to \$11,220 for persons with grade 12, a differential of \$3,261. Not only did persons with grade 12 education earn more than their grade 11 counterparts, but the difference between the groups generally increased substantially with age.

Registered nurses. This reference group was used for operating room nursing since only registered nurses were eligible for acceptance into the training program. The basic earnings for registered nurses are presented in Table 22.

Table 23

Annual Before-Tax Earnings of Saskatchewan Females Working as Wage Earners on a Full-Time,Full-Year Basis by Educational Level, Age Category and Year

Educational Level Age Category	Year			Percentage Change 76/74
	1974	1975	1976	
Grade 12 Certificate				
20 - 24	$5,911	$6,920	$7,899	+33.7%
25 - 29	7,598	8,895	10,154	+33.7
30 - 34	8,057	9,432	10,768	+33.7
35 - 39	8,178	9,573	10,929	+33.7
40 - 44	8,351	9,777	11,161	+33.7
45 - 54	8,396	9,829	11,220	+33.7
55 - 64	8,678	10,159	11,596	+33.7
Grade 11 Standing				
20 - 24	4,784	5,600	6,393	+33.7
25 - 29	5,767	6,751	7,707	+33.7
30 - 34	5,883	6,887	7,862	+33.7
35 - 39	5,793	6,782	7,742	+33.7
40 - 44	5,951	6,967	7,954	+33.7
45 - 54	5,956	6,972	7,959	+33.7
55 - 64	6,245	7,312	8,347	+33.7

Source. See Appendix G.

LABOUR FORCE ACTIVITY PATTERNS

Five aspects of labour force activity were considered in this study: (1) survival rates, (2) labour force participation rates, (3) employment rates, (4) full-time versus part-time employment, and (5) the workload of part-time employees.

Survival Rates

The survival rates for a cohort of Saskatchewan females with a starting age of 20 years are shown in Table 24. No disaggregation by educational level or occupational group was available.

Between the age of 21 and 37 years, the probability of death was very low. In fact, 99 per cent of the starting cohort was likely to survive until age 37. From age 38 onwards, the survival rates declined at a slightly faster rate. At age 64 the probability was that 88 per cent of the starting cohort would still be living.

Labour Force Participation Rates

Table 25 reports labour force participation rates for Saskatchewan females by educational level and age category as of 1976. Generally, the participation rates rose with higher educational levels (the only deviation from this occurred between the grade 11 and grade 12 levels beyond the age of 45).

The difference in participation rates between educational levels was most evident for persons with post-secondary education as compared to the other levels. Females with a post-secondary level of education consistently had higher labour force participation rates. The difference was most pronounced for the 15 to 24 and the 45 to 54 age categories.

Table 24

Survival Rates for a Cohort of Saskatchewan Females at Age 20

Future Age	Proportion of Cohort likely to be Living (Percentages)
20	100.0
21 - 37	99.0
38 - 43	98.0
44 - 47	97.0
48 - 51	96.0
52 - 53	95.0
54 - 56	94.0
57	93.0
58	92.0
59	92.0
60	91.0
61	91.0
62	90.0
63	89.0
64	88.0

Source. Derived from Statistics Canada *Life Tables, Canada and Provinces 1970-1972*. (Ottawa: Information Canada, 1974), pp. 44-45.

Table 25

Labour Force Participation Rates for Saskatchewan Females by Age Category and Educational Level 1976

	Educational Level		
Age Category	Grade 11 Standing %	Grade 12 Certificate %	Non-University Post-Secondary Certificate/Diploma %
15 - 24	48.9	71.3	78.2
25 - 34	53.2	55.2	59.5
35 - 44	62.6	64.1	66.7
45 - 54	60.5	59.0	73.9
55 - 64	46.2	44.6	54.3

Source. Statistics Canada. Labour Force Activity by Age, Sex and Educational Characteristics. 1976 Census, Volume 5, Catalogue 94-806. (Ottawa: Statistics Canada, December, 1978), pp. 15-51 to 15-58.

The largest difference, by far, was with respect to the 45 to 54 age category where the participation rate for persons with post-secondary education was 14 percentage points higher than for the persons with a grade 12 level of education (Table 25).

The general pattern of labour force participation rates, as shown in Table 25, was for the rates to fall sharply between the 15 to 24 and the 25 to 34 age categories, to rise somewhat in the 35 to 44 age category, and then to fall again in the 55 to 64 age category. A marked difference existed by educational level in the 45 to 54 age category. Whereas the labour force participation rate declined for the grade 11 and grade 12 groups, the rate increased for the post-secondary groups.

Employment Rates

The labour force essentially comprised all females willing and available to work; therefore, both employed and unemployed persons were included. The employment rate was defined as the percentage of the labour force actually employed.

Employment rates for Saskatchewan females by age category and educational level as of 1976 are presented in Table 26. The employment rates exceeded 90 per cent for all educational levels. The rates for the grade 12 group generally exceeded those for the grade 11 group and the post-secondary group. However, the compound effect of the labour force participation rate and the employment rate must be recognized. As shown in the following calculation for the 25 to 34 age cateory, a higher proportion of the post-secondary group (57 per cent) was employed than the grade 12 group (54 per cent) despite the slightly lower employment rate for the post-secondary group.

Table 26

Employment Rates[a] for Saskatchewan Females by Age Category and Educational Level 1976

	Educational Level		
Age Category	Grade 11 Standing %	Grade 12 Certificate %	Non-University Post-Secondary Certificate/Diploma %
15 - 24	94.4	94.7	94.5
25 - 34	98.6	97.4	95.9
35 - 44	97.9	98.4	97.3
45 - 54	97.9	98.2	99.0
55 - 64	97.9	98.6	96.9

Source. Derived from Statistics Canada. Labour Force Activity by Age, Sex and Educational Characteristics. 1976 Census, Volume 5, Catalogue 94-806. (Ottawa: Statistics Canada, December, 1978), pp. 15-51 to 15-58.

[a] Refers to the percentage of females in the labour force who were employed. Females not participating in the labour force were excluded from the calculation.

	Labour Force Participation Rate (%)		Employment Rate (%)		Proportion of Population Employed (%)
Grade 12 Group	55.2	x	97.4	=	53.8
Post-Secondary Group	59.5	x	95.9	=	57.1

In effect, the lower employment rate was more than offset by higher participation rate. This was the case for all age categories.

Full-Time or Part-Time Employment

The distribution of total female employment in Saskatchewan, by full-time and part-time employment, is presented in Table 27. No disaggregations by educational level or age category were available.

Of the total employed females, 74 per cent worked full-time and 26 per cent worked part-time.

Workload of Part-Time Employees

The workload of part-time employees was determined by comparing the average hours worked per week by part-time employees with the average hours worked per week by full-time employees. As shown in Table 27, the workload of part-time employees was 41 per cent of a full-time workload. These data were for Canadian females generally. No disaggregations by educational level or age category were available.

Relative Effect of Labour Force Activity Adjustments

All five labour force activity adjustments were essential to derive real-world earnings profiles. However, only the adjustments for labour force participation and employment discriminated in terms of

Table 27

Employment Distribution, Average Hours Worked Per Week and Relative Workloads by Full-Time and Part-Time Employees 1977

Employment Type	Distribution of Total Female Employment in Saskatchewan	Actual Average Hours Worked Per Week by Canadian Females	Relative Workload
Full-Time	74.1%	34	100.0%
Part-Time	25.9%	14	40.7%[a]

Source. Derived from Statistics Canada, The Labour Force. Feature: 1977 Annual Averages. (Ottawa: Statistics Canada, January, 1978) pp. 75 and 77.

[a] Actual average hours worked per week by part-time workers divided by average hours worked per week by full-time workers multipied by 100.

educational level. Therefore, the differences between the earnings profiles of health personnel and their reference groups resulting from the adjustments were attributable to these two adjustments alone. Moreover, the single most important adjustment was the labour force participation rate.

OVERVIEW OF THE EARNINGS PROFILES

The constructed lifetime earnings profiles provided the annual earnings at each age. Average before-tax earnings at selected ages for 1976 are presented in Tables 28 and 29.

Health Personnel

The maximum earnings, profile A, were the basic earnings data without any adjustments for labour force activity. In effect the implicit assumption was that health personnel would work on a full-time basis from the time of graduation to age 65. Earnings profile B presented the realistic upper limit for earnings as adjustments for death and unemployment were made. Earnings profile C represented the real-world situation in that the five labour force activity adjustments were included.

Since the labour force activity adjustments did not distinguish between occupational groups or among years, the proportional relationship between the profiles at a given age was constant for all health personnel groups in all years. The most pronounced difference among the earnings profiles was between A and C.

Table 28

Average Before-Tax Earnings of Health Personnel at Selected Ages Using Earnings Profiles A, B, and C 1976

Health Personnel Classification Age	Earnings Profile A	Earnings Profile B	Earnings Profile C	C as a % of A
Registered Nurse				
Age 24	$12,540	$11,732	$7,765	61.9%
Age 35	13,620	13,120	7,407	54.4
Age 45	13,620	13,079	8,181	60.1
Age 55	13,620	12,406	5,702	41.9
Registered Psychiatric Nurse				
Age 24	11,880	11,114	7,357	61.9
Age 35	14,940	14,391	8,125	54.4
Age 45	14,940	14,347	8,974	60.1
Age 55	14,940	13,608	6,254	41.9
Dental Nurse				
Age 24	13,524	12,652	8,375	61.9
Age 35	14,724	14,183	8,007	54.4
Age 45	14,724	14,139	8,844	60.1
Age 55	14,724	13,412	6,164	41.9
Health Record Administrator				
Age 24	11,520	10,778	7,134	61.9
Age 35	12,468	12,010	6,780	54.4
Age 45	12,468	11,973	7,489	60.1
Age 55	12,468	11,357	5,220	41.9
Certified Nursing Assistant				
Age 24	10,836	10,138	6,710	61.9
Age 35	11,244	10,831	6,115	54.4
Age 45	11,244	10,798	6,754	60.1
Age 55	11,244	10,242	4,707	41.9
Certified Dental Assistant				
Age 24	9,720	9,094	6,019	61.9
Age 35	10,536	10,149	5,730	54.4
Age 45	10,536	10,118	6,329	60.1
Age 55	10,536	9,597	4,411	41.9
Medical Lab. Technologist				
Age 24	12,168	11,384	7,535	61.9
Age 35	13,476	12,981	7,329	54.4
Age 45	13,476	12,941	8,095	60.1
Age 55	13,476	12,275	5,641	41.9
Certified Combined Technician				
Age 24	11,244	10,519	6,963	61.9
Age 35	11,244	10,831	6,115	54.4
Age 45	11,244	10,798	6,754	60.1
Age 55	11,244	10,242	4,707	41.9
Operating Room Nurse				
Age 26[a]	12,660	12,020	6,053	47.8
Age 35	13,740	13,235	7,472	54.4
Age 45	13,740	13,195	8,253	60.1
Age 55	13,740	12,515	5,752	41.9

[a] Age 26 was used because that was the average age of graduates in the first year of earnings.

Table 29

Average Before-Tax Earnings of the Grade 12 and 11 Reference Groups at Selected Ages Using Earnings Profiles A, B, and C 1976

Reference Group Age	Earnings Profile A	Earnings Profile B	Earnings Profile C	C as a % of A
Grade 12 Group				
Age 24	$ 7,899	$ 7,406	$4,469	56.6%
Age 35	10,929	10,647	5,776	52.9
Age 45	11,220	10,687	5,337	47.6
Age 55	11,596	10,748	4,057	35.0
Grade 11 Group				
Age 24	6,393	5,975	2,473	38.7
Age 35	7,742	7,504	3,976	51.4
Age 45	7,959	7,558	3,870	48.6
Age 55	8,347	7,681	3,004	36.0

The earnings of health personnel under profile C were 62 per cent of maximum earnings at age 25. At ages 35, 45 and 55 the corresponding proportions were 54, 60 and 42 per cent. Only at age 55, then, did the real-world earnings of health personnel fall below 50 per cent of maximum earnings (Table 28).

Grade 12 and 11 Reference Groups

Table 29 presents the average before-tax earnings for the grade 12 and grade 11 reference groups at selected ages as of 1976.

Focusing on the grade 12 group, real-world earnings (profile C) were 57 per cent of maximum earnings (profile A) at age 24. At ages 35, 45 and 55 the corresponding proportions were 52, 48 and 35 per cent. Therefore, the effect of labour force activity adjustments was to reduce the earnings of the grade 12 group proportionately more than in the case of health personnel.

Looking at the grade 11 group, the real-world earnings as a proportion of maximum earnings were further reduced. In fact only at age 35 were the real-world earnings slightly above half the maximum earnings.

Effects on Earnings Differentials

The analysis of the earnings profiles in this section demonstrated that adjustments for labour force activity, particularly the labour force participation, affected the earnings of health personnel and the grade 12 and grade 11 reference groups differently. The grade 12 and grade 11 reference groups retained a smaller proportion of their maximum earnings than did health personnel. The effect of the labour force participation adjustments, therefore, was to proportionately increase the differential between health personnel and their reference groups. This effect was most pronounced in the 45 to 54 age category. The exception, of course, was operating room nursing because the reference group had the same labour force activity pattern.

SUMMARY OF CHAPTER 6

The construction of earnings profiles in this study was based on basic earnings and labour force activity patterns.

Basic earnings of health personnel varied substantially among the various groups; the highest were for dental nurses and the lowest generally existed for certified dental assistants. The number of steps in the salary scale also varied. At one extreme were health record administrators, certified nursing assistants and certified combined technicians with only three steps. At the other extreme were registered psychiatric nurses and medical laboratory technologists with seven steps. Generally the basic earnings of health personnel increased at a faster rate than did overall salaries and wages in Saskatchewan during the period under review.

The analysis of age-earnings for reference groups revealed that the grade 12 group had substantially higher earnings than did the grade 11 group.

Of the five adjustments for labour force activity, the single most important adjustment in terms of discriminating power among groups was the labour force participation rate. Females with a post-secondary level of education had higher participation rates than females with a grade 12 or grade 11 level of education.

The overview of the earnings profiles at selected ages revealed that the real-world earnings of health personnel (profile C) were between 42 and 62 per cent of maximum earnings (profile A). However, for the grade 12 and grade 11 reference groups, the real-world earnings were only between 35 and 57 per cent of maximum earnings. The effect of labour force activity adjustments, particularly the labour force participation rate, was to proportionately increase the earnings differentials between health personnel and their reference groups (except for operating room nursing).

Chapter 7

SOCIAL MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

This chapter presents the findings of the study concerning the social monetary returns to health personnel training. The first section reports the lifetime earnings differentials associated with training. In the next section, these lifetime earnings differentials are compared to the costs of training using four evaluative methods.

Social monetary returns were calculated using alternative cost bases (per student and per graduate), alpha coefficients (77 and 100 per cent) and discount rates (5, 10 and 15 per cent). The complete set of results is provided in Appendices M and O. The discussion of findings in this chapter focuses on the analysis using per graduate costs, an alpha coefficient of 77 per cent, and discount rates of 5 and 10 per cent. The per graduate cost basis was selected because the training programs under review were largely tailored for specific occupations and graduation from the programs was essential to enter the respective occupations. The alpha coefficient of 77 per cent was chosen because the international review of this matter by Psacharapoulos (1975:55) revealed this to be the overall average. Finally, both the 5 and 10 per cent discount rates were selected because of controversy surrounding the choice of the appropriate rate. Moreover, the inclusion of the findings using each of these rates demonstrates the extent to which the results were sensitive to the discount rate.

The discussion in this chapter focuses on the findings using earnings profiles A and C. The results using earnings profile B were excluded because of their similarity to the results using earnings profile A. However, the results using earnings profile B are contained in the appendices.

SOCIAL LIFETIME EARNINGS DIFFERENTIALS FOR HEALTH PERSONNEL

Social lifetime earnings differentials were computed by determining the annual difference in before-tax earnings between health personnel and their reference groups, totaling these differences, and substracting the per graduate social cost from the total. No consideration was given to the differing value of a dollar over time in these calculations. The complete set of results using alternative cost bases, alpha coefficients, and discount rates is presented in Appendix M, Tables 77, 78, 79 and 80, including the analyses using earnings profile B.

Findings Using Earnings Profile A

The lifetime earnings differentials for health personnel by training program are presented in Table 30. The differentials reported therein were computed using the primary reference group.

The earnings differentials varied widely among the programs. In 1976, for instance, the highest differential was $95,034 for dental nursing and the lowest was $-10,048 for operating room nursing. In fact, negative differentials existed for five programs in that year.

Negative earnings differentials were found with respect to the nursing assistant, dental assistant and operating room nursing programs in all years of the study. The underlying explanation for the pronounced negative pattern for nursing assistants and dental assistants was that

Table 30

Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profiles A and C by Training Program and Year

Program	Year and Earnings Profile					
	1974		1975		1976	
	A	C	A	C	A	C
Two Year Programs						
Diploma Nursing Kelsey	$42,566	$30,731	$31,940	$26,532	$66,073	$45,176
Diploma Nursing Wascana	40,856	29,021	29,795	24,387	64,861	43,964
Psychiatric Nursing	60,337	34,843	57,851	34,488	92,354	54,607
Dental Nursing	66,678	37,504	65,821	39,517	95,034	56,543
Health Record Administrator	-11,665	-163	-28,566	-6,947	21,733	20,353
One Year or Less Programs						
Nursing Assistant Kelsey	-39,393	-5,421	-54,947	-9,743	-2,769	14,928
Nursing Assistant Wascana	-40,021	-6,049	-56,337	-11,133	-3,851	13,846
Dental Assistant Kelsey	-40,940	-5,779	-56,673	-10,987	-30,894	2,946
Dental Assistant Wascana	a	a	-54,038	-8,352	-32,509	1,331
Medical Lab. Technology	48,469	35,759	31,899	29,916	67,938	50,162
Combined Technician	-39,956	-6,421	-54,693	-9,866	1,379	17,764
Operating Room Nursing	-6,305	-7,673	-5,155	-6,513	-10,048	-11,291

Note. Computations were made using an alpha coefficient of 77 per cent, the per graduate cost basis, a zero discount rate, and the primary reference group. Results using an alpha coefficient of 100 per cent, the per student cost basis and differing combinations of alpha coefficients and cost bases are included in Appendix M.

[a] This program was not in operation in 1974.

their maximum earnings were less than the maximum earnings of the grade 12 reference group. With respect to operating room nurses, the explanation was that the small salary increment was insufficient to offset the cost of training.

The situation relative to health record administrators and combined technicians was unique in that negative differentials were found in the first two years, but positive differentials existed in 1976. The combined technician case is particularly interesting as these personnel received exactly the same salaries as did nursing assistants. Moreover, the per graduate social costs of the combined technician program were higher. The positive differential for combined technicians in 1976 as opposed to a negative for the nursing assistants was entirely due to the lower average age of combined technician graduates (20 years as compared to 22 for nursing assistants).

Another noteworthy finding relative to the negative differentials was that the differentials were generally negative even when using an alpha coefficent of 100 per cent and the per student cost basis (see Appendix M, Table 77). The one exception was nursing assistant Kelsey where a positive differential existed in 1976.

Using a grade 11 reference group for nursing assistants and dental assistants revealed very different results as shown in Table 31. Rather than negative differentials, positive differentials were found in all years. In fact, the differential for the nursing assistant programs in 1976 ($96,884 and $95,792) exceeded the differential for the dental nurse program which otherwise had the highest differential of all the programs.

Table 31

Lifetime Social Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group by Earnings Profile and Training Program

Program	Year 1974	1975	1976
Earnings Profile A			
Nursing Assistant Kelsey	$42,041	$42,416	$96,884
Nursing Assistant Wascana	41,440	41,123	95,792
Dental Assistant Kelsey	42,471	42,873	75,853
Dental Assistant Wascana	a	45,201	74,116
Earnings Profile C			
Nursing Assistant Kelsey	30,662	32,799	62,072
Nursing Assistant Wascana	30,061	31,506	60,980
Dental Assistant Kelsey	32,664	34,483	53,536
Dental Assistant Wascana	a	36,811	51,799

Note. Computations were made using an alpha coefficient of 77 per cent, the per graduate cost basis and a zero discount rate. Results using an alpha coefficient of 100 per cent, the per student cost basis and differing combinations of alpha coefficients and cost bases are included in Appendix M.

[a] This program was not in operation in 1974.

Earnings differentials tended to fluctuate during the three years under review. The dominant pattern was for a decline in positive differentials between 1974 and 1975 and then an increase between 1975 and 1976. The highest positive differentials were in 1976. Therefore, the relationship between the social costs of training and the earnings differentials of health personnel did not remain constant during the period under review. Between 1975 and 1976 the earnings differentials for health personnel increased more than did the costs of training.

The only one year program having consistently positive earnings differentials was medical laboratory technology. Moreover, the differential for this program generally surpassed the differential for all two year programs except dental nursing and psychiatric nursing.

Findings Using Earnings Profile C

The findings of the study using the real-world earnings profiles are also presented in Table 30.

A comparison of findings using earnings profile C with findings using earnings profile A revealed two important differences. First, where positive earnings differentials existed under A, the earnings differentials under C were smaller. For example in the case of dental nursing in 1976, the differential dropped from $95,034 under A to $56,543 under C. However, in none of these cases did the earnings differential become negative. Thus even when the real-world earnings profiles were considered, the additional earnings associated with training more than offset the costs. This finding must be tempered with the recognition that the earnings differentials, as discussed here, were based on a zero discount rate. A more thorough analysis of the returns to training using discounted cash flow techniques is presented in the subsequent section of this chapter.

Second, the comparison of the findings using two earnings profiles revealed that programs having a negative earnings differential under profile A tended to show improvements (either lower negative values or positive values) under profile C. This finding was most pronounced in 1976 when the nursing assistant and dental assistant had positive earnings differentials under earnings profile C. The difference in labour force participation rates between health personnel and the grade 12 reference group was instrumental in changing the net earnings from negative to positive. The only program which consistently had negative earnings differentials was operating room nursing. However, the differences between earnings profiles A and C which were observed for the other programs could not be expected for operating room nursing as the same labour force participation rates were used for both operating room nurses and their reference group.

MEASUREMENT OF THE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

Social earnings differentials, as reported above, provide only a crude measure of the returns to health personnel training. However the results were adequate to single out those programs which obviously had negative monetary returns.

The following section provides a more rigorous analysis of the monetary returns using four methods. The payback period method, while conceptually inferior to the others, does provide a rough measure in that it identifies the number of years before the initial investment is recovered (at a zero discount rate). The remaining three methods (net discounted present value, benefit/cost ratio and internal rate of return) are discounted cash flow approaches and as such they provided more critical appraisals of the returns on investment. The complete set of results pertaining to social monetary returns is presented in Appendix O, Tables 85, 86, 87 and 88. The discussion in this chapter focuses on those analyses using the per graduate cost basis, an alpha coefficent of 77 per cent, and discount rates of 5 and 10 per cent.

The lifetime earnings differentials used in this study were regarded as overall averages within each occupational group. This was particularly the case with respect to earnings profile C because overall averages for labour force activity were used. Consequently, the results reported in the following tables were also viewed as representing overall averages for each occupational group.

Findings Using Earnings Profile A

Payback period. As shown in Table 32 a wide variation existed in the length of the payback periods. Obviously a payback period could not be expected in the cases where negative earnings differentials existed. In 1974 and 1975, the investment was never recovered for the health record administrator, nursing assistant, dental assistant, combined technician and operating room nursing programs. The same situation existed in 1976 for nursing assistant Wascana, the dental assistant programs and operating room nursing. As noted previously, the use of an alpha coefficient of 100 per cent did not change the situation regarding the negative returns. The use of a per student cost basis instead of a per graduate basis made a difference in the case of nursing assistant Wascana in 1976 where a payback period of 15 years existed with an alpha coefficient of 77 per cent (see Appendix O, Table 85).

Table 32

Average Social Monetary Returns to Health Personnel Training Using Earnings Profile A by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Diploma Nursing Kelsey						
1974	8	11,638	1,336	1.8	1.1	11.1
1975	11	6,182	N	1.3	N	8.0
1976	8	18,645	3,021	1.9	1.1	11.8
Diploma Nursing Wascana						
1974	9	9,928	N	1.6	N	9.7
1975	13	4,037	N	1.2	N	6.7
1976	9	17,433	1,809	1.8	1.1	11.0
Psychiatric Nursing						
1974	12	10,965	N	1.5	N	7.9
1975	14	8,164	N	1.3	N	7.0
1976	10	22,888	726	1.8	1.0	10.3
Dental Nursing						
1974	11	14,406	N	1.6	N	9.0
1975	11	14,282	N	1.5	N	8.9
1976	8	26,014	3,873	1.9	1.1	11.6
Health Record Administrator						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	16	N	N	N	N	4.7
Nursing Assistant Kelsey						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	16	N	N	N	N	<1
Nursing Assistant Wascana						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1
Dental Assistant Kelsey						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1
Dental Assistant Wascana						
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1
Medical Lab. Technology						
1974	9	13,200	1,944	2.2	1.2	11.6
1975	10	6,977	N	1.6	N	8.8
1976	7	21,739	6,825	2.6	1.5	15.3
Combined Technician						
1974	-	N	-	[a]	N	<1
1975	-	N	-	[a]	N	<1
1976	8	221	N	1.0	N	[a]
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent and the per graduate cost basis. Results using an alpha coefficient of 100 per cent, the per student cost basis, a discount rate of 15 per cent and different value combinations for these parameters are included in Appendix O. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

The shortest payback periods were in the range of 7 to 10 years; the shortest being seven years in the case of medical laboratory technology in 1976.

Again the use of a grade 11 reference group for the nursing assistant and dental assistant programs produced extremely different results (Table 34). In fact, a payback period of only four years was found for both programs in 1976.

Present values. The results of the present value analysis are presented in Table 32. Given the more rigorous nature of this analysis, programs without a payback period obviously had negative present values. Moreover, programs with a negative present value using a five per cent discount rate naturally had a negative present value at 10 per cent.

The highest present values were found in 1976, the highest being dental nursing with $26,014 (with a 5 per cent discount rate).

Negative present values using a five per cent discount rate were found in all years of the study for the following programs: health record administrator, nursing assistant, dental assistant and operating room nursing. The combined technician program was essentially in the same category except that a very small positive value ($221) existed in 1976.

Use of the grade 11 reference group for the nursing assistant and dental assistant programs revealed positive present values with a 10 per cent discount rate in all years of the study. This finding contrasts with the negative present values using a grade 12 reference group.

With the exception of the special analysis using the grade 11 reference group, no program consistently had positive present values throughout the study using the 10 per cent discount rate. However, in

1976, positive present values did exist for all two year programs, except health record administrator, and for the medical laboratory technology program using the 10 per cent discount rate. The highest present value in that year was for medical laboratory technology which had a present value of $6,825 using a 10 per cent discount rate.

Benefit/cost ratios. In that the benefit/cost ratio method is really a variant of the present value method, ratios exceeding 1.0 could be expected only in cases where a positive present value existed. Accordingly, no program had a benefit/cost ratio greater than 1.0 in all years of the study using a 10 per cent discount rate (Table 32). The special analysis using the grade 11 reference group did reveal benefit/cost ratios exceeding 1.0 using a 10 per cent discount rate (Table 34).

The highest benefit/cost ratios existed in 1976. Using the 5 per cent discount rate, the ratios in that year ranged from a high of 2.6 in the case of medical laboratory technology to less than 1.0 for health record administrator, nursing assistant, dental assistant and operating room nursing.

Rate of return. The results of the internal rate of return analysis are also presented in Table 32. A wide range in returns, as noted from the other evaluative methods, was also reflected in this analysis.

Internal rates of return of less than one per cent were found consistently with respect to nursing assistant, dental assistant, operating room nursing and generally for the health record administrator and combined technician programs. The basic pitfall of the internal rate of return method, of providing misleading results when the net earnings stream fluctuates between positive and negative, was evident in regards to the combined technician program in 1976.

At the other extreme, internal rates of return as high as 12 per cent were found for diploma nursing Kelsey and dental nursing and as high as 15 per cent for medical laboratory technology.

In keeping with the results using the other methods, the highest internal rates of return existed in 1976 and the lowest in 1975. The special analysis using the grade 11 reference groups again revealed markedly different results. In fact, internal rates of return as high as 29 and 19 per cent were found for the nursing assistant and dental assistant programs, respectively in 1976 (Table 34).

Only five programs (diploma nursing Kelsey, diploma nursing Wascana, psychiatric nursing, dental nursing and medical laboratory technology) yielded internal rates of return exceeding one per cent in all three years of the study. The results for these five programs can be summarized as follows:

	Lowest Rate	Highest Rate
1974	7.9% (Psychiatric Nursing)	11.6% (Medical Lab. Technology)
1975	6.7% (Diploma Nursing Wascana)	8.9% (Dental Nursing)
1976	10.3% (Psychiatric Nursing)	15.3% (Medical Lab. Technology)

Summary. Each of the four methods provided a different type of measure of the social monetary returns to health personnel training. The following general findings emerged from the four measures of monetary returns using earnings profile A.

First, the highest returns existed for dental nursing, psychiatric nursing, diploma nursing, and medical laboratory technology programs. The precise rank order varied depending on the year and the evaluative method used.

Second, the nursing assistant and dental assistant programs consistently failed to yield positive returns when a grade 12 reference group was used. However, the same programs had among the highest returns when a grade 11 reference group was used.

Third, the operating room nursing program consistenly failed to yield positive returns. The combined technician and health record administrator were in the same category except that small positive returns were observed in 1976.

Fourth, the highest returns existed in 1976 and the lowest returns were for 1975.

Finally, as evident from Appendix O, Table 85 the use of the per student cost basis and an alpha coefficient of 100 per cent produced higher returns. For instance, the highest internal rate of return rose to 24 per cent (for medical laboratory technology) in 1976 when the per student cost basis and an alpha coefficient of 100 per cent were used simultaneously. The rate for this same program using the per graduate cost basis and an alpha coefficient of 77 per cent was 15 per cent as reported above. However, the use of the per student cost basis and an alpha coefficient of 100 per cent did not change the basic pattern in the cases where dominant negative returns were found with the per graduate cost basis and an alpha coefficient of 77 per cent. For instance, looking at the 18 cases of internal rates of return of less than one per cent in Table 32, not one case changed to a rate of greater than one per cent when the per student cost basis and an alpha coefficient of 100 per cent were used.

Findings Using Earnings Profile C

Payback period. As shown in Table 33, the payback periods increased substantially in all those cases where a payback period existed using earnings profile A. For instance, the payback period for diploma nursing Kelsey in 1976 was 14 years using earnings profile C as opposed to 8 years using A. Whereas the shortest period using A in 1976 was seven years for medical laboratory technology, the payback period for this same program using C was 10 years.

A most revealing finding, also reflected in the social earnings differentials, was that some programs not having a payback period using earnings profile A did have a payback period using earnings profile C. This occurred in 1976 for the nursing assistant Wascana, dental assistant Kelsey and dental assistant Wascana programs which had payback periods of 24, 34 and 39 years, respectively using earnings profile C.

Again the use of a grade 11 reference group made a distinct difference with respect to the nursing assistant and dental assistant programs. Whereas the investment was never recovered for these programs in either 1974 or 1975 using the grade 12 reference group, payback periods of 8 to 9 years for the nursing assistant programs and from 5 to 8 years for the dental assistant programs existed when a grade 11 reference group was used (Table 34).

Present values. Table 33 also reports the present values for health personnel training using earnings profile C. Where positive present values existed using earnings profile A, the values using C were reduced substantially. For example, the present values for diploma nursing Kelsey in 1976 were $18,645 and $6,366 with the five per cent

Table 33

Average Social Monetary Returns to Health Personnel Training Using Earnings Profile C by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Diploma Nursing Kelsey						
1974	15	3,988	N	1.3	N	6.9
1975	19	490	N	1.0	N	5.2
1976	14	6,366	N	1.3	N	7.1
Diploma Nursing Wascana						
1974	17	2,278	N	1.1	N	6.0
1975	22	N	N	N	N	4.4
1976	15	5,154	N	1.2	N	6.6
Psychiatric Nursing						
1974	20	N	N	N	N	4.8
1975	22	N	N	N	N	4.2
1976	16	5,091	N	1.2	N	6.2
Dental Nursing						
1974	19	8	N	1.0	N	5.0
1975	19	485	N	1.0	N	5.1
1976	15	6,853	N	1.2	N	6.7
Health Record Administrator						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	24	N	N	N	N	3.3
Nursing Assistant Kelsey						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	23	61	N	1.0	N	5.0
Nursing Assistant Wascana						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	24	N	N	N	N	4.3
Dental Assistant Kelsey						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	34	N	N	N	N	a
Dental Assistant Wascana						
1975	-	N	N	N	N	<1
1976	39	N	N	N	N	a
Medical Lab. Technology						
1974	12	6,564	N	1.6	N	8.3
1975	14	3,991	N	1.4	N	7.0
1976	10	11,597	300	1.8	1.0	10.2
Combined Technician						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	15	1,529	N	1.1	N	6.1
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent and the per graduate cost basis. Results using an alpha coefficient of 100 per cent, the per student cost basis, a discount rate of 15 per cent and different value combinations for these parameters are included in Appendix O. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 34

Average Social Monetary Returns to Nursing Assistant and Dental Assistant Training
Using a Grade 11 Reference Group by Earnings Profile, Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Earnings Profile A						
Nursing Assistant Kelsey						
1974	6	14,232	5,149	2.8	1.6	17.5
1975	6	14,292	5,029	2.7	1.6	16.9
1976	4	36,315	16,932	4.6	2.7	29.0
Nursing Assistant Wascana						
1974	6	13,631	4,548	2.6	1.5	16.2
1975	7	12,999	3,736	2.3	1.4	14.5
1976	4	35,223	15,840	4.2	2.4	26.0
Dental Assistant Kelsey						
1974	7	12,852	3,625	2.6	1.4	14.5
1975	8	12,143	2,490	2.2	1.3	12.6
1976	6	25,155	9,487	3.3	1.9	19.0
Dental Assistant Wascana						
1975	7	14,471	4,818	2.9	1.6	16.4
1976	7	23,418	7,750	2.8	1.6	16.4
Earnings Profile C						
Nursing Assistant Kelsey						
1974	8	8,887	2,046	2.1	1.3	13.2
1975	8	9,533	2,230	2.1	1.3	13.3
1976	5	21,189	8,308	3.1	1.8	20.3
Nursing Assistant Wascana						
1974	8	8,286	1,445	2.0	1.2	12.1
1975	9	8,240	937	1.8	1.1	11.2
1976	6	20,096	7,216	2.8	1.7	18.0
Dental Assistant Kelsey						
1974	7	9,317	2,224	2.1	1.3	13.4
1975	8	9,138	1,429	1.9	1.1	11.8
1976	5	16,717	5,506	2.5	1.5	16.4
Dental Assistant Wascana						
1975	5	11,466	3,757	2.5	1.5	16.3
1976	7	14,980	3,769	2.2	1.3	13.7

Note. The above returns were derived using an alpha coefficient of 77 per cent and the per graduate cost basis. Results using an alpha coefficient of 100 per cent, the per student cost basis, a discount rate of 15 per cent and different value combinations for these parameters are included in Appendix O.

discount rate. The use of earnings profile C produced negative present values in some cases where a positive value existed using A. This occurred for diploma nursing Wascana (1975) and psychiatric nursing (1974 and 1975). With the 10 per cent discount rate, all programs in all three years had negative present values using C with the exception of medical laboratory technology in 1976.

However, the use of earnings profile C actually worked in the other direction as well. In 1976 higher positive present values for nursing assistant Kelsey and combined technician were found using C than using A. (In fact, nursing assistant Kelsey had a negative present value using A). Again the impact of the differing labour force participation rates between these health personnel and their reference group was the explanatory factor.

Only one program in one year (medical laboratory technology in 1976) had a positive present value with the 10 per cent discount rate. The health record administrator, nursing assistant Wascana, the two dental assistant programs and operating room nursing consistently had negative present values with a five per cent discount rate. Moreover, the nursing assistant Kelsey and the combined technician programs had a positive present value with a five per cent discount rate in only 1976.

Benefit/cost ratios. As with the present value analysis, where positive returns existed using earnings profile A, lesser returns were found using earnings profile C. The reverse effect was again noted with nursing assistant Kelsey and combined technician in 1976 where benefit/cost ratios of 1.0 and 1.1 were found as compared to negative returns using A (Table 33).

With a discount rate of five per cent, benefit/cost ratios of less than 1.0 existed in all years for the health record administrator, nursing assistant Wascana, the dental assistant programs and operating room nursing. As shown in Table 34, using a grade 11 reference group produced high benefit/cost ratios for the nursing assistant and dental assistant programs (e.g. 4.6 and 3.3 for nursing assistant Kelsey and dental assistant Kelsey with a five per cent discount rate in 1976). Only one program, the medical laboratory technology program in 1976, yielded a benefit/cost ratio of at least 1.0 using the 10 per cent discount rate. The highest benefit/cost ratios were observed in 1976 and the lowest were found in 1975.

Rate of return. As shown in Table 33, internal rates of return ranged from less than one per cent to a high of 10 per cent using earnings profile C. A decline in the rates, as compared to the results using earnings profile A, was noted in all cases where a rate exceeding one per cent existed using A. But the reverse effect was again evident in certain cases where rates less than one per cent (or meaningless rates) existed using A. This occurred in regard to both nursing assistant programs and the combined technician program in 1976.

The highest internal rates of return were found in 1976 and the lowest in 1975. Consistently, rates of return of less than one per cent were found for the operating room nursing program and generally similar rates were found for the health record administrator, nursing assistant, dental assistant and combined technician programs. When a grade 11 reference group was used, the results were very different for the nursing assistant and dental assistant programs; with internal rates of return as high as 20 and 16 per cent, respectively. The highest internal rates of return were consistently found for medical laboratory technology with rates of 8.3, 7.0 and 10.2 per cent for 1974, 1975 and 1976, respectively. The defect in the internal rate of return analysis, namely the production of a meaningless rate when the net earnings stream fluctuates between positive and negative, was again observed; this time for the dental assistant programs in 1976.

As in the analysis using earnings profile A, only five programs (diploma nursing Kelsey, diploma nursing Wascana, psychiatric nursing, dental nursing and medical laboratory technology) yielded internal rates of return exceeding one per cent in all three years of the study. The results for these five programs can be summarized as follows:

	Lowest Rate	Highest Rate
1974	4.8% (Psychiatric Nursing)	8.3% (Medical Lab. Technology)
1975	4.2% (Psychiatric Nursing)	7.0% (Medical Lab. Technology)
1976	6.2% (Psychiatric Nursing)	10.2% (Medical Lab. Technology)

Summary. The following general findings emerged from the four measures of social monetary returns using earnings profile C. First, the highest returns were found for the same programs as in analysis using earnings profile A, namely: dental nursing, psychiatric nursing, diploma nursing and medical laboratory technology. Also, the highest returns always existed in 1976.

Second, the nursing and dental assistant programs generally failed to yield positive returns when a grade 12 reference group was used. (However, there was not consistent failure as in the case of earnings profile A.) Again, the use of a grade 11 reference group produced very different, and in fact relatively high, returns.

Third, as in the analysis using earnings profile A, the operating room nursing program consistently failed to yield positive returns. The combined technician and health record administrator programs also had negative returns except that small positive returns were found in 1976.

Finally, as shown in Appendix O, Table 87, the use of the per student cost basis and an alpha coefficient of 100 per cent produced higher returns than those reported in this chapter. In fact, the highest return in 1976 (still for medical laboratory technology) was 16 per cent as compared to 10 per cent noted earlier. Yet, as in the analysis using earnings profile A, much the same pattern emerged regardless of the cost basis or alpha coefficient chosen. For instance even when the per student cost basis and an alpha coefficient of 100 per cent were used together, in only three of the fourteen instances where internal rates of return were less than one per cent in Table 33 did a rate greater than one per cent emerge.

SUMMARY OF CHAPTER 7

This chapter has presented the findings of the study regarding social monetary returns to health personnel training.

The analysis of lifetime social earnings differentials revealed that differentials ranged from negative values to as high as $95,034 using earnings profile A. Using earnings profile C the range was from negative to a high of $56,543. The highest differentials existed in 1976.

Four methods were then used to compare the earnings differentials to the cost of training: (1) payback period, (2) net discounted present value, (3) benefit/cost ratio, and (4) internal rate of return.

The payback period, using earnings profile A, ranged from programs where the investment was never recovered prior to retirement at age 65 to a program having a payback period of only 7 years. Using earnings profile C the shortest payback period was 14 years. The shortest payback periods occurred in 1976 for medical laboratory technology. The health record administrator, nursing assistant, dental assistant, combined technician and operating room nursing programs did not yield sufficient returns to recover the investment in any year using earnings profile A. However, a payback period was found in 1976 for all these programs except operating room nursing using earnings profile C.

The present value analysis revealed a range from negative values to a high of $26,014 using earnings profile A and from negative to a high of $11,597 using earnings profile C. (using a five per cent discount rate). The highest values were found in 1976. Only one program had a positive present value using a 10 per cent discount rate, the medical laboratory technology program in 1976. Negative present values were consistently found for the health record administrator, nursing assistant Wascana, dental assistant, and operating room nursing programs using either earnings profile A or C.

Benefit/cost ratios naturally followed the patterns established with the present value analysis. The highest benefit/cost ratio being for medical laboratory technology in 1976: 2.6 using earnings profile A and 1.8 using earnings profile C with a five per cent discount rate.

The highest internal rates of return existed in 1976; the highest was 15.3 per cent for medical laboratory technology using earnings profile A and 10.2 per cent for the same program using earnings profile C. Rates less than one per cent or meaningless rates of return were found in all years for the dental assistant programs and operating room nursing under earnings profiles A and C. While the health record administrator, nursing assistant and combined technician programs had rates of less than one per cent in 1974 and 1975, rates exceeding one per cent were observed in 1976.

Special analyses using a grade 11 reference group were conducted for the nursing assistant and dental assistant programs. The results of these analyses revealed very different findings as compared to the results using a grade 12 reference group. Whereas generally negative returns were found using the grade 12 reference groups, very high positive returns were evident using the grade 11 reference groups.

Chapter 8

PRIVATE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

This chapter presents the findings of the study regarding the private monetary returns to health personnel training. Private monetary returns are reported for self-supporting students, bursary recipients and allowance recipients. The first section reports the private lifetime earnings differentials. Subsequently, these earnings differentials are compared to the costs of training using the four evaluative methods.

As in the case of social returns, the analysis of private returns was conducted using alpha coefficients of 77 and 100 per cent and discount rates of 5, 10 and 15 per cent. The complete set of results is contained in Appendices N and P. As in the analysis of social monetary returns, the discussion of private returns in this chapter, focuses on those analyses using earnings profiles A and C, an alpha coefficient of 77 per cent, and discount rates of 5 and 10 per cent.

Since private costs were deemed to be the same at each Institute, no differentiation between the duplicated programs is made in this chapter.

PRIVATE LIFETIME EARNINGS DIFFERENTIALS FOR HEALTH PERSONNEL

Private lifetime earnings differentials were computed by comparing the after-tax earnings of health personnel and their reference groups. Private costs of training were then subtracted from the total earnings differentials. The complete set of results using alternative alpha coefficients, earnings profiles and types of students is contained in Appendix N, Tables 81, 82, 83 and 84.

Findings Using Earnings Profile A

Table 35 reports the private lifetime earnings differentials for the three types of students using earnings profile A, and an alpha coefficient of 77 per cent.

The private lifetime earnings differentials varied widely among the programs. In 1976, for instance, the differentials for self-supporting students ranged from negative values for the nursing assistant, dental assistant and operating room nursing programs to a high of $83,307 for dental nursing (Table 35).

Looking at overall patterns, the highest earnings differentials were always found in 1976 and the lowest differentials were in 1975. Of the three types of students in any given program, allowance recipients naturally had the highest differentials, followed by bursary recipients. The lowest differentials were for self-supporting students.

A key finding was that the provision of an allowance did not generally change the pattern of earnings differentials. Where negative differentials existed for self-supporting students, negative differentials were also observed for allowance recipients. The nursing assistant programs in 1976 were an exception; whereas the differential for self-supporting students was $-541, the differential for allowance recipients was $3,119 (Table 35).

As in the case of the social earnings differentials, a special analysis using the grade 11 reference group for the nursing assistant and dental assistant programs revealed markedly different results as

Table 35

Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile A by Training Program and Year

Program	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Two Year Programs									
Diploma Nursing	$37,624	$38,308	n.e.	$26,044	$26,954	n.e.	$56,846	$57,826	n.e.
Psychiatric Nursing	52,373	53,056	n.e.	55,133	56,043	n.e.	82,275	83,255	n.e.
Dental Nursing	58,825	59,509	n.e.	60,337	61,247	n.e.	83,307	84,287	n.e.
Health Record Administrator	-2,816	-2,132	n.e.	-14,228	-13,318	n.e.	23,549	24,529	n.e.
One Year or Less Programs									
Nursing Assistant	-25,129	-24,787	-22,015	-40,701	-40,246	-37,533	-541	-51	3,119
Dental Assistant	-26,377	-26,035	-23,263	-40,519	-40,064	-37,351	-18,861	-18,371	-15,201
Medical Lab. Technology	38,527	38,869	41,641	24,563	25,018	27,731	57,029	57,519	60,689
Combined Technician	-23,197	-22,855	-20,083	-38,848	-38,393	-35,680	3,309	3,799	6,969
Operating Room Nursing	-1,764	-1,593	n.e.	-969	-741	n.e.	-1,998	-1,753	n.e.

Note. The use of n.e. denotes that students were not eligible for training allowances.

compared to the analysis using a grade 12 reference group. For instance, whereas the differential for allowance recipients was $3,119 for the nursing assistant programs in 1976 with a grade 12 reference group (Table 35), the differential was $79,727 using a grade 11 reference group (Table 37).

All two year programs, with the exception of health record administrator, had consistently positive earnings differentials for both bursary recipients and self-supporting students. The health record administrator program had negative earnings differentials in 1974 and 1975. In 1976, positive differentials of $23,549 and $24,529 were found for self-supporting students and bursary recipients, respectively (Table 35).

Of the one year or less programs, only medical laboratory technology consistently had positive earnings differentials. Differentials of $57,029, $57,519 and $60,689 existed in 1976 for self-supporting students, bursary recipients and allowance recipients, respectively (Table 35).

As in the case of social earnings differentials, the use of an alpha coefficient of 100 per cent did not change the basic patterns for the earnings differentials. An examination of Table 89 in Appendix P reveals that programs showing negative differentials at 77 per cent also showed negative differentials at 100 per cent.

Findings Using Earnings Profile C

The private earnings differentials using earnings profile C are presented in Table 36.

Table 36

Lifetime Private Earnings Differentials for Health Personnel Using
Earnings Profile C by Training Program and Year

Program	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Two Year Programs									
Diploma Nursing	$29,358	$30,042	n.e.	$25,263	$26,173	n.e.	$42,909	$43,889	n.e.
Psychiatric Nursing	36,354	37,038	n.e.	39,486	40,396	n.e.	55,194	56,174	n.e.
Dental Nursing	40,192	40,876	n.e.	42,768	43,678	n.e.	56,445	57,425	n.e.
Health Record Administrator	8,209	8,893	n.e.	4,803	5,713	n.e.	24,895	25,875	n.e.
One Year or Less Programs									
Nursing Assistant	1,233	1,575	4,347	-3,376	-2,921	-208	16,230	16,720	19,890
Dental Assistant	1,093	1,435	4,207	-2,845	-2,390	323	9,068	9,558	12,728
Medical Lab. Technology	31,866	32,208	34,980	26,879	27,334	30,047	45,922	46,412	49,582
Combined Technician	2,873	3,215	5,987	-1,703	-1,248	1,465	19,212	19,702	22,872
Operating Room Nursing	-2,597	-2,426	n.e.	-2,458	-2,230	n.e.	-3,368	-3,123	n.e.

Note. The use of n.e. denotes that students were not eligible for training allowances.

Table 37

Lifetime Private Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group by Earnings Profile, Type of Student and Year

Program	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Earnings Profile A									
Nursing Assistant	$36,897	$37,239	$40,011	$34,605	$35,060	$37,774	$76,069	$76,561	$79,727
Dental Assistant	37,284	37,626	40,398	36,398	36,853	39,567	62,911	63,403	66,569
Earnings Profile C									
Nursing Assistant	29,065	29,407	32,179	29,851	30,306	33,020	52,739	53,231	56,397
Dental Assistant	30,979	31,321	34,093	32,790	33,245	35,959	48,453	48,945	52,111

The results using earnings profile C revealed the following similarities with the analysis using earnings profile A: a wide variation in earnings differentials existed among the programs; highest returns were observed in 1976; provision of a training allowance did not change the basic pattern of the earnings differentials; the only one year or less program having consistently positive earnings differentials was medical laboratory technology; and the use of an alpha coefficient of 100 per cent did not change the basic pattern of earnings differentials. Also, as in the analysis using earnings profile A, the use of a grade 11 reference group for the nursing assistant and dental assistant programs produced high positive differentials (Table 37) as compared to negative or very low positive returns using a grade 12 reference group.

However, there were two basic differences between the results using earnings profile C and the results using earnings profile A. First, in cases where a positive differential existed using A, a lower positive differential occurred with C. However, in no case did the differential change from positive to negative. This finding is consistent with the findings regarding social returns. Second, where negative earnings differentials existed using A, the effect of using earnings profile C was to change the differential in many cases from negative to positive. (The only definite exception was operating room nursing where such a change could not be expected given the same labour force participation rates for operating room nurses and their reference group.) This reversal from negative to positive was evident with respect to health record administrator, nursing assistant, dental assistant and the combined technician programs. In the latter three cases such a reversal did not occur in 1975, but the negative differentials were substantially reduced. For instance, whereas the earnings differentials for self-supporting students in the nursing assistant program was $-40,701 using earnings profile A (Table 35), the differential using C was $-3,376 (Table 36). The tendency to reverse negative differentials using earnings profile C was also consistent with the findings regarding social returns.

MEASUREMENT OF THE PRIVATE MONETARY RETURNS TO SELF-SUPPORTING STUDENTS

The private lifetime earnings differentials, as reported above, provide only a crude measure of the monetary returns to health personnel training. The following section provides a more rigorous analysis using the four evaluative methods. The complete set of results is provided in Appendix P, Tables 89 to 95.

The existence of a payback period, positive present values, benefit/cost ratios greater than 1.0 and internal rates of return greater than one per cent all signified positive returns under the respective methods. This section focuses on self-supporting students. The differences in findings for bursary recipients and allowance recipients are discussed in subsequent sections of this chapter.

As with the social returns, the results presented herein are regarded as representing averages within each occupational group.

Findings Using Earnings Profile A

Payback period. The payback periods, as presented in Table 38, ranged from programs where the costs of the investment were never recovered prior to age 65 to a program having a payback period of only four years. The shortest payback periods existed in 1976 and the longest were in 1975.

Table 38

Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students Using Earnings Profile A by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Two Year Programs						
Diploma Nursing						
1974	6	13,025	4,833	2.6	1.6	17.5
1975	7	7,879	1,590	1.8	1.2	12.3
1976	5	20,116	8,061	2.9	1.8	19.5
Psychiatric Nursing						
1974	7	17,202	5,945	3.1	1.7	17.0
1975	7	17,319	5,279	2.8	1.6	15.3
1976	6	28,459	11,331	3.7	2.1	20.5
Dental Nursing						
1974	5	21,564	9,536	3.7	2.2	23.7
1975	5	21,436	8,908	3.2	1.9	21.0
1976	4	30,776	13,943	3.9	2.8	25.4
Health Record Administrator						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	8	6,620	510	1.6	1.1	10.7
One Year or Less Programs						
Nursing Assistant						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	6	N	N	N	N	<1
Dental Assistant						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1
Medical Lab. Technology						
1974	6	13,460	5,351	4.3	2.3	19.6
1975	8	7,489	1,709	2.6	1.4	12.9
1976	4	21,859	10,509	5.1	3.0	29.6
Combined Technician						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	4	3,609	2,322	1.7	1.4	[a]
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

In 1976, a payback period of four years was noted for dental nursing, medical laboratory technology and the combined technician programs. However, the payback period method was misleading with respect to the combined technician program. Although a payback period of only four years existed, the earnings differentials were actually negative in the last 10 years of working life. Therefore, while the initial investment was recovered within four years of graduation, the overall lifetime earnings situation was not comparable to the other two programs which also had a four year payback period.

The two year programs had payback periods ranging from four to seven years in all years of the study (Table 38). The exception was health record administrator which only had a payback period in 1976, a period of eight years.

Of the one year programs, only the medical laboratory technology program consistently had a payback period. The periods were 6, 8 and 4 years for 1974, 1975 and 1976, respectively (Table 38).

The investment costs were never recovered prior to age 65 in the case of the dental assistant and operating room nursing programs in any year of the study. A similar situation existed for the nursing assistant and combined technicians programs except that these programs had a payback period in 1976.

Using a grade 11 reference group for the nursing assistant and dental assistant programs again produced markedly different results. For instance, the dental assistant program had payback periods of 4, 4 and 3 years for 1974, 1975 and 1976, respectively (Table 44).

Present Values. Table 38 also presents the results of the present value analysis. Many of the patterns exhibited in the lifetime earnings differentials and payback period analyses were also evident here. The range of present values in 1976, using a 10 per cent discount rate, was from negative values to a high of $13,943 for dental nursing. Negative values were observed in all years for the nursing assistant, dental assistant and operating room nursing programs.

A noteworthy finding was that all two year programs, except health record administrator, consistently had positive present values using the 10 per cent discount rate. The same situation existed for medical laboratory technology.

Present values for the nursing assistant and dental assistant programs were also consistently positive with the 10 per cent discount rate when a grade 11 reference group was used (Table 44). This stands in sharp contrast to the consistently negative present values when a grade 12 reference group was used (Table 38).

Benefit/cost ratios. The basic pattern established with the present value analysis was evident in the benefit/cost ratios. Where negative present values existed, benefit/cost ratios of less than 1.0 emerged.

The highest benefit/cost ratio was for medical laboratory technology in 1976 where a ratio of 3.0 existed with a 10 per cent discount rate. The next highest ratios were 2.3 and 2.1 for dental nursing and psychiatric nursing, respectively (Table 38).

The use of a grade 11 reference group for the nursing assistant and dental assistant programs produced the highest benefit/cost ratios in the study. For instance 1976, the ratios were 4.7 and 3.6, respectively, with a 10 per cent discount rate (Table 44).

Rate of return. The highest internal rates of return, as reported in Table 38, were in 1976. The range in that year was from rates of less than one per cent to a high of 29.6 per cent for medical laboratory technology.

With the exception of health record administrator, the two year programs had internal rates of return between 12.3 and 25.4 per cent. The health record administrator program had rates of less than one per cent in 1974 and 1975, but in 1976 it had an internal rate of return of 10.7 per cent (Table 38).

The only one year program having internal rates of return greater than one per cent was medical laboratory technology. The one slight exception was the combined technician program where the fluctuation of the net earnings stream from positive to negative resulted in a meaningless rate of return in 1976. Moreover, as is evident from Table 89 in Appendix P, the use of an alpha coefficient of 100 per cent did not change these negative patterns.

The special analyses using a grade 11 reference group, as reported in Table 44, revealed very high internal rates of return. In 1976, for instance, rates of return of greater than 50 per cent and of 36.5 per cent were found for the nursing assistant and dental assistant programs, respectively.

As in the case of the social returns, only five programs (the two diploma nursing programs, psychiatric nursing, dental nursing, medical laboratory technology) yielded internal rates of return exceeding one per cent in all three years of the study. The ranges in rates for these programs were as follows:

	Lowest Rate	Highest Rate
1974	17.0% (Psychiatric Nursing)	23.7% (Dental Nursing)
1975	12.3% (Diploma Nursing)	21.0% (Dental Nursing)
1976	19.5% (Diploma Nursing)	29.6% (Medical Lab. Technology)

Summary. The following general findings emerged from the four measures of private monetary returns to self-supporting students using earnings profile A. First, all two year programs except the health record administrator had consistently positive returns regardless of what method was used. The same was true for medical laboratory technology. Internal rates of returns for these programs ranged between 12.3 and 29.6 per cent.

Second, consistently negative returns were found with respect to nursing assistant, the dental assistant and the operating room nursing programs. (A slight exception was for the nursing assistant programs which had a payback period of 6 years in 1976.)

Third, the returns varied greatly among programs and among years; although the ranking of programs remained fairly similar.

Finally, the use of the grade 11 reference group not only reversed the negative return pattern for the nursing assistant and dental assistant programs, but it produced positive returns which were among the highest in the study.

Findings Using Earnings Profile C

Payback period. As presented in Table 39, the shortest payback periods using earnings profile C was four years, for the medical laboratory technology and combined technician programs. Generally, the

Table 39

Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students Using Earnings Profile C by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Two Year Programs						
Diploma Nursing						
1974	9	7,332	773	1.9	1.1	11.1
1975	12	4,764	N	1.5	N	8.5
1976	8	11,403	2,034	2.1	1.2	12.2
Psychiatric Nursing						
1974	10	9,253	1,105	2.1	1.1	11.3
1975	11	9,380	401	2.0	1.0	10.4
1976	8	15,423	3,429	2.5	1.3	13.2
Dental Nursing						
1974	7	11,785	3,246	2.5	1.4	14.5
1975	8	11,820	2,595	2.2	1.3	13.1
1976	6	16,978	5,141	2.6	1.5	15.5
Health Record Administrator						
1974	25	N	N	N	N	3.7
1975	29	N	N	N	N	1.9
1976	14	3,995	N	1.4	N	7.5
One Year or Less Programs						
Nursing Assistant						
1974	32	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	8	3,785	236	1.7	1.0	10.6
Dental Assistant						
1974	35	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	26	642	N	1.1	N	a
Medical Lab. Technology						
1974	7	9,375	2,870	3.3	1.7	15.9
1975	8	6,664	938	2.4	1.2	11.6
1976	4	14,880	5,880	3.8	2.1	21.7
Combined Technician						
1974	30	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	4	5,682	1,810	2.1	1.3	15.9
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

payback periods were longer using earnings profile C than using A. For instance, the dental nursing program had a payback period of six years as compared to four years using A.

However, a payback period existed in many cases using earnings profile C where no payback was observed with A. This occurred with respect to health record administrator in 1974 and 1975, nursing assistant in 1974, dental assistant in 1974 and 1976, and combined technician in 1974.

Present values. Much the same pattern emerged with the present value analysis as with the payback period method. In effect, programs with positive present values using earnings profile A had reduced positive present values using C. For instance the present value for dental nursing in 1976 declined from $13,943 to $5,141 with a 10 per cent discount rate.

The other central difference between the results for each earnings profile was that in cases where negative present values existed using A, positive present values or lesser negative values emerged with C.

Present values among programs varied greatly. In 1976, the range was from negative values to a high of $5,880 using a 10 per cent discount rate.

All two year programs, with the exception of health record administrator in all years and diploma nursing in 1975, had positive present values with a 10 per cent discount rate in each year of the study. The only one year program having consistently positive present values was medical laboratory technology.

As in the other analyses in this study, the use of a grade 11 reference group produced markedly different results for the nursing assistant and dental assistant programs (Table 45). For instance, the present value for the dental assistant program in 1976 was $9,298 using a grade 11 reference group as opposed to a negative value using a grade 12 reference group (with a 10 per cent discount rate).

Benefit/cost ratios. The pattern established in the present value analysis also appeared with the benefit/cost ratios. A decline in benefit/cost ratios was noted using earnings profile C wherever a ratio greater than 1.0 existed using A. For instance, the benefit/cost ratio for the diploma nursing program in 1976 declined from 1.8 to 1.2 (with a 10 per cent discount rate).

But again results using earnings profile C showed some improvements over A wherever a benefit/cost ratio of less than 1.0 existed using A. This was most evident in regards to the nursing assistant program in 1976 which had a benefit/cost ratio of 1.0 under C with a 10 per cent discount rate.

The highest benefit/cost ratio with the 10 per cent discount rate was 2.1 for medical laboratory technology in 1976.

Rates of return. The effects of using earnings profile C were again evident in the internal rate of return analysis. Where rates greater than one per cent existed under earnings profile A, the rates were lower using C. For example, the rate for medical laboratory technology in 1976 dropped from 29.6 per cent to 21.7 per cent. But in several cases where internal rates of return of less than one per cent existed using earnings profile A, rates greater than one per cent were observed using C. In 1976, for instance, a rate of 10.6 per cent was found for the nursing assistant program using earnings profile C.

All the two year programs consistently had internal rates of return greater than one per cent. The highest rates were observed in 1976. The range in that year was from 7.5 to 15.5 per cent.

Of the one year programs, only medical laboratory technology consistently had rates of return greater than one per cent; the rates being 15.9, 11.6 and 21.7 for 1974, 1975 and 1976, respectively.

The special analysis using the grade 11 reference group revealed internal rates of return as high as 44.5 and 40.7 per cent for the nursing assistant and dental assistant programs, respectively (Table 45).

Six programs (the two diploma nursing programs, psychiatric nursing, dental nursing, medical laboratory technology, and health record administrator) yielded internal rates of return exceeding one per cent in all years of the study. The ranges in rates for these programs can be summarized as follows:

	Lowest Rate	Highest Rate
1974	11.1% (Diploma Nursing)	15.9% (Medical Lab. Technology)
1975	8.5% (Diploma Nursing)	13.1% (Dental Nursing)
1976	12.2% (Diploma Nursing)	21.7% (Medical Lab. Technology)

Summary. The following general findings emerged from the four measures of private monetary returns to self-supporting students using earnings profile C. First, where positive returns existed using earnings profile A, lesser positive returns were observed using earnings profile C.

Second, where negative returns existed using earnings profile A, positive returns or less negative returns emerged using earnings profile C.

Third, all two year programs, except health record administrator, consistently had positive returns (with the 10 per cent discount rate) regardless of what evaluative method was used.

Fourth, consistently negative returns were found for operating room nursing and generally negative returns were observed for the nursing assistant, dental assistant and combined technician programs.

Fifth, the highest internal rates of return were noted in 1976. In that year only the operating room nursing failed to have an internal rate of return greater than one per cent. (However, a meaningful rate was not available for the dental assistant programs.) The highest rate of return in that year was 15.9 per cent, for medical laboratory technology.

MEASUREMENT OF THE PRIVATE MONETARY RETURNS TO BURSARY RECIPIENTS

The monetary returns to health personnel training for bursary recipients, are presented in Table 40 using earnings profile A, in Table 41 using earnings profile C and in Tables 44 and 45 using a grade 11 reference group.

As noted in chapter 5, the average bursary awards for one year programs were $342, $455 and $490 for 1974, 1975 and 1976, respectively. The corresponding amounts for two year programs were $684, $910 and 980. In the case of operating room nursing, the awards were estimated to be one half of the award for one year programs.

The amount of the bursary awards were relatively small compared to the total private costs or to private lifetime earnings. Therefore, it was not surprising to find that no major differences existed in the returns to bursary recipients as compared to self-supporting students.

Table 40

Average Private Monetary Returns to Health Personnel Training for Bursary Recipients Using Earnings Profile A by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($) 5%	Present Value ($) 10%	Benefit/Cost Ratios 5%	Benefit/Cost Ratios 10%	Internal Rate of Return (%)
Two Year Programs						
Diploma Nursing						
1974	5	13,710	5,517	2.8	1.7	19.3
1975	7	8,789	2,500	2.0	1.3	14.0
1976	5	21,096	9,041	3.2	1.9	21.7
Psychiatric Nursing						
1974	6	17,886	6,629	3.4	1.9	18.4
1975	7	18,229	6,190	3.1	1.7	16.7
1976	5	29,439	12,312	4.0	2.3	22.5
Dental Nursing						
1974	4	22,248	10,220	4.0	2.4	26.0
1975	5	22,346	9,818	3.6	2.1	23.3
1976	4	31,756	14,923	4.3	2.5	28.2
Health Record Administrator						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	7	7,600	1,490	1.8	1.2	12.2
One Year or Less Programs						
Nursing Assistant						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	5	N	N	N	N	<1
Dental Assistant						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1
Medical Lab. Technology						
1974	5	13,802	5,693	4.7	2.5	20.8
1975	7	7,944	2,164	2.8	1.5	13.8
1976	4	22,349	10,999	5.7	3.3	32.2
Combined Technician						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	3	4,099	2,812	1.9	1.6	a
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated from positive to negative.

Table 41

Average Private Monetary Returns to Health Personnel Training for Bursary Recipients Using Earnings Profile C by Training Program and Year

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Two Year Programs						
Diploma Nursing						
1974	8	8,016	1,457	2.1	1.2	12.3
1975	10	5,674	N	1.7	N	9.5
1976	7	12,383	3,014	2.3	1.3	13.6
Psychiatric Nursing						
1974	9	9,937	1,789	2.3	1.2	12.3
1975	10	10,290	1,311	2.2	1.2	11.4
1976	8	16,403	4,409	2.7	1.5	14.5
Dental Nursing						
1974	6	12,469	3,930	2.7	1.5	16.0
1975	7	12,730	3,505	2.5	1.4	14.6
1976	6	17,958	6,121	2.9	1.6	17.3
Health Record Administrator						
1974	24	N	N	N	N	4.2
1975	29	N	N	N	N	2.4
1976	13	4,974	N	1.5	N	8.4
One Year or Less Programs						
Nursing Assistant						
1974	32	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	7	4,275	726	1.9	1.2	12.1
Dental Assistant						
1974	34	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	12	1,132	N	1.2	N	a
Medical Lab. Technology						
1974	6	9,716	3,212	3.6	1.9	17.1
1975	8	7,119	1,393	2.6	1.3	12.6
1976	4	15,370	6,370	4.2	2.3	23.9
Combined Technician						
1974	14	N	N	N	N	a
1975	-	N	N	N	N	<1
1976	4	6,172	2,300	2.3	1.5	18.5
Operating Room Nursing						
1974	-	N	N	N	N	<1
1975	-	N	N	N	N	<1
1976	-	N	N	N	N	<1

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

While no major differences existed in the returns between self-supporting students and bursary recipients, two important observations were drawn. First, in no case using either earnings profiles A or C did the amount of the bursary award change the basic pattern of negative or positive returns.

Second, where positive returns existed for self-supporting students, the results for bursary recipients showed increased positive returns. In 1976, the internal rates of return for bursary recipients were between one and three per cent higher than for self-supporting students. In the case of the special analysis using a grade 11 reference group, the internal rates of return were increased between three and six per cent (Tables 44 and 45).

Using earnings profile A, the payback periods for bursary recipients ranged from programs where the costs of investment were never recovered prior to age 65 to a program having a payback period of only three years, the latter being the combined technician program. Looking at all programs where payback periods existed, the range was from 3 to 7 years. Present values ranged from negative to a high of $14,923; the highest was for dental nursing in 1976 (using a 10 per cent discount rate). Benefit/cost ratios ranged from less than 1.0 to 3.3 for medical laboratory technology in 1976 (with a 10 per cent discount rate). Internal rates of return ranged from less than one per cent to a high of 32.2 per cent for medical laboratory technology in 1976 (Table 40).

Using earnings profile C, the shortest payback period for bursary recipients was 4 years, again in the case of the combined technician program. A range of between 4 and 34 years was noted for programs having a payback period. Present values ranged from negative to a high of $6,370 with a 10 per cent discount rate. Benefit/cost ratios ranged from less than 1.0 to a high of 2.3. Internal rates of return varied from less than one per cent to 23.9 per cent. The highest present value, benefit/cost ratio and internal rate of return were for medical laboratory technology in 1976.

As in the case of previous analyses, there were two main differences between results using earnings profiles A and C. First, where positive returns existed using A, the returns were reduced using C. Second, in several cases where negative returns existed using A, positive returns were revealed using C.

MEASUREMENT OF THE PRIVATE MONETARY RETURNS TO ALLOWANCE RECIPIENTS

Only students enrolled in the nursing assistant, dental assistant, medical laboratory technology and combined technician programs were eligible for training allowances. The average allowances were $2,716, $2,751 and $3,227 for 1974, 1975 and 1976, respectively. Moreover, these students did not incur any direct educational costs since these costs were paid on their behalf by Canada Manpower. The private costs of training for allowance recipients, therefore, were much lower than for either self-supporting students or bursary recipients.

Findings Using Earnings Profile A

The returns to health personnel training for allowance recipients using earnings profile A are presented in Table 42. Despite the greatly reduced private costs, the basic pattern of the returns for allowance recipients was essentially the same as for self-supporting students. In no instance did positive returns appear for allowance recipients where negative returns existed for self-supporting students.

Table 42

Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Earnings Profile A by Training Program

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return(%)
		5%	10%	5%	10%	
Nursing Assistant						
1974	2	N	N	N	N	<1
1975	–	N	N	N	N	<1
1976	2	4,290	3,644	3.6	3.2	>50
Dental Assistant						
1974	–	N	N	N	N	<1
1975	–	N	N	N	N	<1
1976	3	N	N	N	N	<1
Medical Lab. Technology						
1974	4	16,574	8,465	19.0	10.2	41.3
1975	4	10,657	4,877	7.5	4.0	24.2
1976	2	25,519	14,169	16.6	9.7	>50
Combined Technician						
1974	2	N	N	N	N	<1
1975	3	N	N	N	N	<1
1976	2	7,269	5,982	5.5	4.7	>50

Note. The above returns were derived using an alpha coefficient of 77 per cent. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

But where positive returns existed for self-supporting students the effect of the allowance was to increase the returns. For instance, the internal rate of return for medical laboratory technology in 1976 was greater than 50 per cent for allowance recipients as compared to 29.6 per cent for self-supporting students.

Findings Using Earnings Profile C

The returns to health personnel training for allowance recipients using earnings profile C are presented in Table 43.

Looking first at the comparison between the earnings profiles, the same dual effect again emerged: positive returns were reduced, but negative returns were either lessened or changed to positive. For example, the benefit/cost ratio in 1976 declined for medical laboratory technology from 9.7 using profile A to 6.9 using earnings profile C. In contrast, a benefit/cost ratio of 1.7 existed for the nursing assistant programs in 1974 using earnings profile C where a ratio of less than 1.0 existed using earnings profile A (with a 10 per cent discount rate).

The impact of the allowance was greater using earnings profile C than using earnings profile A. Whereas the allowance did not change the basic pattern of returns between self-supporting students and allowance recipients using earnings profile A, some changes were noted using earnings profile C. A change from a negative to a positive return pattern was evident for the nursing assistant, dental assistant programs in 1974 and for the combined technician program in both 1974 and 1975. The benefit/cost ratios in 1974 for allowance recipients were 1.7, 1.5 and 2.9 for the nursing assistant, dental assistant and combined technician programs, respectively (with a 10 per cent discount rate).

Table 43

Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Earnings Profile C by Training Program

Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return(%)
		5%	10%	5%	10%	
Nursing Assistant						
1974	2	1,298	624	2.4	1.7	a
1975	–	N	N	N	N	<1
1976	2	7,445	3,896	5.6	3.4	>50
Dental Assistant						
1974	4	1,121	450	2.2	1.5	a
1975	9	N	N	N	N	a
1976	3	4,302	2,099	3.6	2.3	a
Medical Lab. Technology						
1974	3	12,489	5,984	14.5	7.5	43.0
1975	4	9,832	4,106	7.0	3.5	25.5
1976	2	18,540	9,540	12.4	6.9	>50
Combined Technician						
1974	2	2,582	1,718	3.8	2.9	a
1975	3	309	246	1.2	1.2	a
1976	2	9,342	5,470	6.7	4.4	>50

Note. The above returns were derived using an alpha coefficient of 77 per cent. N denotes negative for the present value analysis. In the case of the benefit/cost ratio, N denotes a negative ratio or a positive ratio less than 1.0. A dash for the payback period analysis indicates that the costs of training were never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 44

Average Private Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group and Earnings Profile A by Type of Student and Year

Type of Student Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Self-Supporting Students						
Nursing Assistant						
1974	3	14,496	7,202	5.3	3.1	35.4
1975	3	13,550	6,581	4.4	2.7	30.8
1976	2	30,708	16,153	8.0	4.7	>50
Dental Assistant						
1974	4	13,485	6,095	5.0	2.8	27.4
1975	4	13,228	5,901	4.3	2.5	25.4
1976	3	23,703	11,566	6.4	3.6	36.5
Bursary Recipients						
Nursing Assistant						
1974	3	14,838	7,544	5.9	3.5	39.8
1975	3	14,005	7,036	5.0	3.0	35.3
1976	2	31,200	16,645	9.0	5.3	>50
Dental Assistant						
1974	4	13,827	6,437	5.6	3.1	30.3
1975	4	13,683	6,356	4.9	2.8	28.6
1976	3	24,195	12,058	7.2	4.1	41.0
Allowance Recipients						
Nursing Assistant						
1974	1	17,610	10,316	72.0	42.6	>50
1975	1	16,719	9,750	22.0	13.2	>50
1976	1	34,366	19,811	47.0	27.5	>50
Dental Assistant						
1974	1	16,599	9,209	67.9	38.1	>50
1975	1	16,397	9,670	21.6	12.4	>50
1976	1	27,361	15,224	37.6	21.4	>50

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P.

Table 45

Average Private Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group and Earnings Profile C by Type of Student and Year

Type of Student Program Year	Payback Period (Years)	Present Value ($)		Benefit/Cost Ratios		Internal Rate of Return (%)
		5%	10%	5%	10%	
Self-Supporting Students						
Nursing Assistant						
1974	3	10,784	5,071	4.2	2.5	32.1
1975	3	10,925	5,012	3.8	2.3	29.1
1976	2	20,438	10,294	5.6	3.3	44.5
Dental Assistant						
1974	3	11,400	5,474	4.4	2.6	33.1
1975	3	12,093	5,804	4.1	2.5	31.9
1976	3	18,425	9,298	5.2	3.1	40.7
Bursary Recipients						
Nursing Assistant						
1974	2	11,126	5,413	4.7	2.8	37.0
1975	2	11,380	5,467	4.2	2.6	34.5
1976	2	20,930	10,786	6.4	3.8	>50
Dental Assistant						
1974	3	11,742	5,816	4.9	2.9	37.6
1975	3	12,548	6,259	4.6	2.8	37.1
1976	2	18,917	9,790	5.8	3.5	46.8
Allowance Recipients						
Nursing Assistant						
1974	1	13,898	8,185	57.0	34.0	>50
1975	1	14,094	8,181	18.7	11.3	>50
1976	1	24,096	13,952	33.2	19.7	>50
Dental Assistant						
1974	1	14,514	8,588	59.5	35.6	>50
1975	1	15,262	8,973	20.2	12.3	>50
1976	1	22,083	12,956	30.5	18.3	>50

Note. The above returns were derived using an alpha coefficient of 77 per cent. Results using an alpha coefficient of 100 per cent, a discount rate of 15 per cent and differing value combinations for these parameters are included in Appendix P.

SUMMARY OF CHAPTER 8

This chapter has presented the findings of the study regarding the private monetary returns to health personnel training.

The analysis of private lifetime earnings differentials for self-supporting students revealed a range from negative differentials to a high of $83,807 using earnings profile A and from negative differentials to a high of $56,445 using earnings profile C. The highest differentials were observed in 1976.

Four methods were used to measure the private earnings differentials: (1) payback period, (2) net discounted present value, (3) benefit/cost ratio, and (4) internal rate of return.

The payback period for self-supporting students using earnings profile A ranged from programs where the costs of investment were never recovered prior to age 65 to programs having a payback period of only four years. The shortest payback period using earnings profile C was again four years. The shortest payback periods were in 1976.

Present values for self-supporting students using earnings profile A with a 10 per cent discount rate ranged from negative values to a high of $14,923. The highest present value using earnings profile C was $5,880. Negative present values were found for nursing assistant, dental assistant and operating room nursing in all years of the study using earnings profile A. However, positive present values were found in 1976 for the nursing assistant and dental assistant program using earnings profile C.

The highest benefit/cost ratios were 3.0 and 2.1 using earnings profile A and C, respectively. Medical laboratory technology was the program having the highest benefit/cost ratios.

The highest internal rate of return to self-supporting students existed in 1976, the highest being 29.6 using earnings profile A and 21.7 using earnings profile C. Again medical laboratory technology had the highest returns.

The special analysis using the grade 11 reference groups in regard to the nursing assistant and dental assistant programs revealed very high positive returns to self-supporting students. This was a sharp contrast to the results using a grade 12 reference group, particularly in 1974 and 1975 when negative returns were found.

The private returns to bursary recipients differed very little from the returns to self-supporting students. In no case was the bursary sufficient to alter a pattern of negative returns. Where positive returns existed for self-supporting students, the effect of the bursary was to increase the returns somewhat.

Despite the greatly reduced private costs to allowance recipients, the basic pattern of returns for allowance recipients was essentially the same as for self-supporting students under earnings profile A. Where negative returns existed for self-supporting students, negative returns also appeared for the allowance recipients. However, in the analysis using earnings profile C, some changes were observed in the basic patterns. In fact, some cases of negative returns to self-supporting students became positive for allowance recipients.

Chapter 9

SUMMARY, CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

OVERVIEW OF THE STUDY

The major objective of this study was to examine the monetary returns on investment in non-university health personnel training in the Province of Saskatchewan. The theory of human capital provided the analytical framework for the study. According to this theory, expenditures on training represent a form of investment because training leads to higher future earnings. Therefore, the analytical framework provided by the theory of human capital focuses on the relationship between the monetary costs and monetary benefits of training. Monetary benefits were derived in this study by estimating lifetime earnings differentials associated with training. The analysis was conducted using cost and earnings data for 1974, 1975 and 1976. Both the perspective of the individual (private) and the perspective of society (social) were adopted in the analysis. A total of 12 training programs were included in the study.

Research Questions

The examination of monetary returns on investment in non-university health personnel training involved three major research questions:

1. What were the monetary costs of training for each of the 12 health personnel training programs in 1974, 1975 and 1976?

2. What were the monetary benefits, in the form of earnings differentials, for each of the 12 health personnel training programs using earnings data for 1974, 1975 and 1976?

3. What were the relationships between monetary benefits and monetary costs, measured in terms of payback periods, net discounted present values, benefit/cost ratios and internal rates of return?

Research Methodology

The research design for this study included a methodology to estimate costs, a methodology for the construction of earnings profiles, and methods to measure the relationship between monetary costs and benefits.

Estimation of costs. Five cost components were used in the estimation of social costs: (1) educational institution costs, (2) foregone earnings of students, (3) government subsidies to students, (4) student educational costs, and (5) imputed costs of interest on the physical plant and of property tax exemptions. Social costs were expressed in terms of per student and per graduate costs.

A grade 12 reference group was used to compute foregone earnings except for the operating room nursing program where a registered nurse reference group was used (only registered nurses were eligible to enter the operating room nursing program). A special analysis of the nursing assistant and dental assistant programs was conducted using a grade 11 reference group (grade 11 was the formal prerequisite for these programs, but in practice most enrollees had grade 12).

Private costs consisted of foregone earnings and student educational costs. Private costs were derived for self-supporting students, bursary recipients and allowance recipients.

Construction of earnings profiles. Since the large majority of students in the programs under review were females, the analysis was conducted by focusing solely on the costs and earnings for females. Three earnings profiles were constructed for both health personnel and their reference groups. Earnings profile A assumed full-time employment from the time of graduation until retirement at age 65. Earnings profile B included adjustments for the probability of survival and employment. Earnings profile C was designed to reflect real-world average earnings by incorporating five adjustments for labour force activity.

The monetary benefits of training were estimated by deriving the difference in lifetime earnings between health personnel and their reference groups. Alpha coefficients of 77 and 100 per cent were used to identify the lifetime earnings differential which could be attributed to training. Before-tax earnings were used in estimating monetary benefits from the social perspective, whereas after-tax earnings were used for the private perspective.

Monetary returns. Four measures of monetary returns were used to examine the relationship between the monetary costs and benefits of training. These were: (1) payback period, (2) net discounted present value, (3) benefit/cost ratio, and (4) internal rate of return.

SUMMARY OF MAJOR FINDINGS

The major findings of the study concerning the monetary costs, monetary benefits, and monetary returns on investment associated with non-university health personnel training are summarized below.

Monetary Costs of Training

The major findings of the study regarding the monetary costs of training pertain to the distribution of social costs, per student social costs, per graduate social costs, and the private costs to self-supporting students, bursary recipients and allowance recipients. Costs reported below are rounded to the nearest hundred dollars.

Distribution of social costs. The distribution of social costs over the three year period, based on the averages of all two year and one year or less programs, was as follows: The largest cost component was foregone earnings of students which represented between 49 and 51 per cent of total social costs for two year programs and between 48 and 50 per cent of total social costs for the one year or less programs.

The second largest cost component was educational institution costs which constituted between 37 and 40 per cent of total social costs for two year programs and between 32 and 36 per cent of total social costs for one year or less programs. Together, then, foregone earnings and educational institution costs accounted for between 80 and 90 per cent of total social costs.

Student educational costs accounted for only 4 to 6 per cent of total social costs. Government subsidies to students represented only one per cent of the total social costs of two year programs, but seven per cent of the total social costs of one year or less programs. The imputed costs of interest on the physical plant and of property tax exemptions accounted for about five per cent of total social costs for both categories of programs.

Per student social costs. The average per student social costs for two year programs were $16,600, $19,300 and $21,300 for 1974, 1975 and 1976, respectively. The corresponding costs for the one year or less programs were $7,800, $8,800 and $10,600.

Substantial variation existed in all years in the per student social costs among the programs. Of the two year programs, diploma nursing Kelsey consistently had the lowest cost and dental nursing consistently had the highest cost. The range was greatest in 1974, from $13,400 to $25,000. The variation in per student social costs was somewhat less for the one year or less programs. The greatest range was in 1976 when per student social costs varied from $9,800 to $12,200, for dental assistant Kelsey and dental assistant Wascana, respectively.

The special analysis of the nursing assistant and dental assistant programs using a grade 11 reference group revealed substantially lower per student social costs. For instance, in 1976 the cost of the nursing assistant Kelsey program was $8,900 as compared to $9,900 using a grade 12 reference group.

Per graduate social costs. The average per graduate social costs for two year programs were $20,500, $23,500 and $24,700 for 1974, 1975 and 1976, respectively. The corresponding costs for the one year or less programs were $10,000, $10,300 and $12,600.

Per graduate social costs were substantially higher than per student social costs. The average cost differentials for two year programs were $3,900, $4,100 and $3,400 for 1974, 1975 and 1976, respectively. The corresponding cost differentials for the one year or less programs were $2,300, $1,500 and $2,000.

As with per student social costs, a substantial range in costs existed among the programs. Also, the use of a grade 11 reference group for the nursing assistant and dental assistant programs resulted in substantially lower costs as compared to the costs using a grade 12 reference group.

Private costs to self-supporting students. Private costs to self-supporting students in two year programs were $8,200, $9,700 and $10,700 for 1974, 1975 and 1976, respectively. The corresponding costs for the one year or less programs were $4,000, $4,800 and $5,300. The private costs for the nursing assistant and dental assistant programs were $3,400, $4,400 using a grade 11 reference group.

Private costs to bursary recipients. The private costs to bursary recipients in two year programs were $7,500, $8,800 and $9,700 for 1974, 1975 and 1976, respectively. The corresponding costs for one year or less programs were $3,700, $4,400 and $4,800.

Private costs to allowance recipients. Only students enrolled in the one year programs were eligible for allowance support from Canada Manpower. The private costs to allowance recipients were $925, $1,638 and $1,632 for 1974, 1975 and 1976, respectively.

Monetary Benefits of Training

The monetary benefits of training, in the form of lifetime earnings differentials, were estimated using three earnings profiles for health personnel and their reference groups. Since the earnings profiles A and B were very similar, only the results using earnings profiles A and C were included in the main discussion. However, the results using earnings profile B are contained in the appendices.

Lifetime earnings differentials were estimated from both the social and private perspectives. Only the results based on an alpha coefficient of 77 per cent were included in the main discussion. Moreover, only the results using the per graduate cost basis were included in the main discussion of social earnings differentials.

Of the three years, the highest lifetime earnings differentials were found in 1976 and the lowest in 1975. Earnings differentials reported below are rounded to the nearest hundred dollars.

Social earnings differentials. Of the 12 health personnel training programs, dental nursing had the highest lifetime earnings differentials in all years of the study. The earnings differentials for this program were $66,700, $65,800 and $95,000 for 1974, 1975 and 1976, respectively.

Negative lifetime earnings differentials were found using earnings profile A for the nursing assistant, dental assistant and operating room nursing program in all years of the study and for the health record administrator and combined technician programs in 1974 and 1975. Another important finding was that these negative patterns did not change even when the per student cost basis and an alpha coefficient of 100 per cent were used. However, the use of a grade 11 reference group for the nursing assistant and dental assistant programs did produce high positive earnings differentials.

Two basic differences emerged with the use of earnings profile C. First, whenever positive earnings differentials existed using earnings profile A, the differential was reduced. However, in no case did the differential change from positive to negative. Second, programs having negative differentials using earnings profile A showed improvements either in terms of a lesser negative differential or a change from a negative to positive differential.

Private earnings differentials. Many of the same patterns were evident in the private lifetime earnings differentials as in the social earnings differentials. The same grouping of programs in terms of negative and positive lifetime earnings differentials emerged. Also, the same basic differences were noted between the results using earnings profiles A and C.

Of the three groups of students, allowance recipients had the highest lifetime earnings differentials and self-supporting students had the lowest earnings differentials. However, an important finding was that neither the bursary nor the allowance was sufficient to offset negative earnings differentials.

Monetary Returns on Investment

The monetary returns on investment were examined from both the social and private perspectives. The measures of monetary returns reflected many of the same patterns as were evident in the analysis of lifetime earnings differentials. Again, the highest results were in 1976 and the lowest were in 1975. Also, programs having negative earnings differentials naturally produced negative results in the various measures of monetary returns.

Social monetary returns. A wide variation existed in the returns on investment using earnings profile A. Payback periods ranged from programs where the investment cost was never recovered prior to age 65 to programs having payback periods of seven to ten years; the shortest being for medical laboratory technology in 1976. Present values ranged from negative values to as high as $26,000 with a five per cent discount rate in 1976; the highest present value was for dental nursing in 1976. Benefit/cost ratios ranged from negative to as high as 2.6 with a five per cent discount rate; the highest ratio was for medical laboratory technology program in 1976. Internal rates of return varied from less than one per cent to as high as 15 per cent; the highest was for medical laboratory technology in 1976. The use of the per student cost basis rather than the per graduate cost and the use of an alpha coefficient of 100 per cent rather than 77 per cent did not alter the basic pattern (positive or negative) of the returns.

The two basic differences which emerged using earnings profile C in the estimation of earnings differentials were also reflected in the measures of monetary returns. First, whenever positive returns existed using earnings profile A, the returns were lower using earnings profile C. Second, whenever negative returns existed using earnings profile A, the returns were improved (either lesser negative or positive) using earnings profile C.

Only five programs (diploma nursing Kelsey, diploma nursing Wascana, psychiatric nursing, dental nursing and medical laboratory technology) yielded positive returns with a five per cent discount rate using earnings profiles A and C (except for diploma nursing in 1975 and psychiatric nursing in 1974 and 1975 using earnings profile C). Using earnings profile A, these programs yielded positive returns with a 10 per cent discount rate only in 1976. The only program which yielded a positive return with a 10 per cent discount rate using earnings profile C was medical laboratory technology and this occurred only in 1976.

The remaining seven programs yielded negative returns with a five per cent discount rate in all years of the study. The exceptions were nursing assistant Kelsey and the combined technician program in 1976. However, the nursing assistant and dental assistant programs yielded high positive returns in all years when a grade 11 rather than a grade 12 reference group was used.

Private monetary returns. Private monetary returns were consistently higher than social monetary returns. The returns to self-supporting students varied considerably among the programs. Using earnings profile A, payback periods ranged from programs where the cost was never recovered prior to age 65 to programs with payback periods of only four years (for dental nursing, medical laboratory technology and combined technician in 1976). Present values ranged from negative to as high as $13,900 for dental nursing with a 10 per cent discount rate. Benefit/cost ratios with a 10 per cent discount rate ranged from negative to 3.0, the latter being for medical laboratory technology in 1976. Internal rates of return varied from less than one per cent to 30 per cent, the latter again being in the case of medical laboratory technology.

The analysis of private monetary returns revealed the same two groupings of programs with a 10 per cent rate as did the analysis of social monetary returns with a 5 per cent discount rate. Generally diploma nursing Kelsey, diploma nursing Wascana, psychiatric nursing, dental nursing and medical laboratory technology yielded positive returns. The remaining seven programs generally yielded negative returns. However, the negative returns were not as pronounced for the health record administrator, nursing assistant and combined technician programs as in the case of social monetary returns. These programs yielded positive returns with a 10 per cent rate in one year, 1976.

Once again the two basic differences between the results using earnings profiles A and C were evident.

The private returns to bursary recipients differed very little from the returns to self-supporting students. Whenever positive returns existed for self-supporting students, the effect of the bursary award was to increase the returns somewhat. For example, in 1976 the internal rates of return were increased between one and three per cent. But, in no case did the bursary change returns from negative to positive.

Private returns to allowance recipients differed substantially from the returns to self-supporting students for those programs having positive returns. For example, the internal rate of return for medical laboratory technology in 1976 using earnings profile A exceeded 50 per cent as compared to 30 per cent for self-supporting students. Another important finding was that the allowance was sufficient in certain cases using earnings profile C to switch the monetary returns from negative to positive.

CONCLUSIONS

The findings of this study supported several conclusions regarding the monetary returns to non-university health personnel training in the Province of Saskatchewan and other conclusions of relevance to the human capital research program.

Monetary Returns to Health Personnel Training

Two guidelines used in the interpretation of results in this study are worthy of repetition. First, the monetary returns observed in this study were regarded as conservative estimates since no adjustment for secular growth was included in the earnings data. Therefore, an upwards adjustment of three per cent, as discussed in Chapter 2, was used in interpreting the monetary returns. Second, 5 per cent was selected as the minimum acceptable rate of return for social monetary returns and 10 per cent was selected as the minimum acceptable rate of return for private monetary returns.

The major conclusions regarding the monetary returns to health personnel training were as follows:

1. Of the three years covered by the study, the highest monetary returns were observed in 1976 and the lowest returns were in 1975. Therefore, the costs of training and the salary levels for health personnel did not increase at uniform rates. Between 1974 and 1975, costs increased faster than salaries whereas the opposite was true between 1975 and 1976.

2. Private monetary returns were consistently higher than social monetary returns. Thus, on the basis of the present analysis, health personnel training was a better investment from the individual standpoint than from the social standpoint.

3. Social monetary returns differed greatly among the 12 health personnel training programs. In effect, three categories of programs emerged using the real-world earnings profile (earnings profile C):

(a) Five programs (diploma nursing Kelsey, diploma nursing Wascana, psychiatric nursing, dental nursing and medical laboratory technology) yielded returns above the minimum acceptable rate of return in all three years of the study.

(b) Three programs (dental assistant Kelsey, dental assistant Wascana and operating room nursing) yielded returns below the minimum acceptable rate of return in all three years of the study.

(c) The remaining four programs (nursing assistant Kelsey, nursing assistant Wascana, combined technician and health record administrator) yielded inconsistent monetary returns. Whereas the returns for these programs were below the minimum acceptable rate of return in 1974 and 1975, the returns in 1976 were above the minimum acceptable rate of return.

4. Private monetary returns also differed greatly among the programs. Using the real-world earnings profile, the same three categories of programs emerged as in the analysis of social monetary returns. However, the categorization of programs in terms of private monetary returns was made using 10 per cent as the minimum acceptable rate of return.

5. Although the nursing assistant and dental assistant programs yielded monetary returns below the minimum acceptable rate of return when a grade 12 reference group was used, these same programs yielded

relatively high returns when a grade 11 reference group was used. Therefore, while these programs were a poor investment from a financial standpoint for persons with a grade 12 level of education, they were an attractive investment for persons with a grade 11 level of education.

6. The negative monetary returns observed in this study were a consequence of low salary levels for the particular health personnel groups rather than of the cost of training. Generally, the cost of training could have been reduced to zero and the negative return patterns would have still emerged. The underlying explanation in these situations (except for operating room nursing) was that the maximum salary levels for the health personnel group were less than the maximum salary for the grade 12 reference group.

7. Two basic distinctions emerged between the monetary returns using earnings profile A (maximum labour force activity) and earnings profile C (real-world labour force activity). Wherever positive returns were observed using earnings profile A, the corresponding returns using earnings profile C were reduced. But, whenever negative monetary returns were observed using profile A, the corresponding returns using earnings profile C were improved. The underlying explanation in both instances was the labour force participation rate.

Since the participation rates were always higher for health personnel than their reference groups (except for operating room nursing), the health personnel group retained a larger proportion of its maximum earnings. Despite this, however, the dollar value of the differential was reduced using earnings profile C and thus lower monetary returns occurred in those programs where a positive return existed using earnings profile A.

The occurrence of negative returns using earnings profile A was due to lower maximum earnings for the health personnel group than for the reference group. In this situation, the effect of differing labour force participation rates was to improve the monetary returns because the health personnel group retained a larger proportion of its maximum earnings than did the reference group. This reduced the negative earnings differential and, in some cases, actually produced higher earnings for the health personnel group resulting in a positive earnings differential.

An important conclusion arising from these results is that the higher labour force participation associated with training can effect positive monetary returns even though the maximum earnings in the particular occupation may be less than for the reference group.

8. The monetary returns for the five programs which generally yielded returns above the minimum acceptable rate of return tended to exceed the rates of return in other studies for similar types of education. Two more specific observations can be made in this regard:

(a) Although the majority of studies have focused solely on the returns to males, the studies still provide a source of "upper limit" data which can be compared to the results using earnings profile A in this study.

The internal rates of return from this study for the five programs referred to above were between 9.7 and 18.3 per cent from the social perspective and from 15.3 to 32.6 per cent from the private perspective (after including the 3 per cent adjustment for secular growth).

A comparison of these results with the returns in other studies, as reported in Table 1, revealed that rates of return for the "acceptable" programs in this study were as high as the returns found elsewhere on one to three years of post-secondary education. Moreover, the results for these five programs in the present study were well above the rates of return observed in several other studies. For example, the most recent study on post-secondary education in Canada reported a social rate of return of eight per cent on four years of post-secondary education. The results of the present study were even more attractive from the private perspective.

(b) The above conclusion provides a comparison by level of education. However, a more meaningful comparison is in terms of the returns to females. For this comparison, the results using earnings profile C were most appropriate.

The internal rates of return for the five programs that generally yielded returns above the minimum acceptable level were from 7.2 to 13.2 per cent using the social perspective and from 11.5 to 24.7 per cent using the private perspective (after including the 3 per cent adjustment for secular growth).

Very little comparative data were available on the returns to females for the type of training considered in this study. The only Canadian studies reporting on any health personnel training similar to the programs reviewed in the present study were those by Stager (1968) and the Systems Research Group (1971). These studies reported social rates of return below four per cent and private rates of return of around 11 per cent for nursing education. The results of the present study for the diploma nursing programs, which were the most comparable programs, were higher both from the social and private perspectives.

9. The monetary returns to bursary recipients and allowance recipients were higher than the returns to self-supporting students. But generally neither the bursary nor the allowance was sufficient to offset a negative monetary return pattern in a program.

Human Capital Research Program

The findings of this study also support the following conclusions which have relevance for the human capital research program:

10. Substantial fluctuation can occur in the monetary returns to educational programs from year to year. This conclusion has relevance for the human capital research program because a common practice has been to conduct rate of return studies using data from a single year. The results of the present study suggest that such a practice should be used very cautiously in the future.

11. Investment in training for females can yield positive returns exceeding the expected returns on alternative investments even when the real-world labour force activity patterns of females are considered. This conclusion has relevance for the human capital research program in view of the many *a priori* assumptions contained in the literature which suggest low or negative returns to investment in females.

12. The negative returns observed for seven programs in this study were a consequence of the low potential earnings level within occupations rather than of labour force activity patterns. This conclusion is pertinent to the human capital research program because of the tendency to assume that negative returns to females are due primarily to low labour force activity.

13. The returns to females using real-world labour force participation rates can be higher than the returns obtained assuming full participation rates. The basic explanation is that female labour force participation rates tend to rise by level of education and this can effect proportionately higher earnings differentials than occurs with full participation rates.

14. Four methods were used in this study to measure monetary returns to training. Several observations arising from a comparison of the results using these methods have relevance for the human capital research program. The overall conclusion was that the use of a variety of methods in human capital studies is advantageous because each method has its own particular strengths and weaknesses. Some of the major strength and weaknesses of each method, as demonstrated in this study, were as follows:

(a) The payback period, although not a commonly used method in human capital studies, provided a simple measure of monetary returns. Despite its simplicity, the method was adequate to identify those programs which had definite negative returns. Programs not providing a payback of investment costs prior to retirement age could not be expected to yield positive returns under any of the other more rigorous methods. Accordingly, the payback period method might serve as an initial screening method in future human capital studies. The method may also be of value to educational policymakers for the screening of programs. However, this method must be used cautiously because it can provide misleading information. There is the well recognized criticism of this method for its failure to consider the time value of money. But this study revealed that the payback method can also provide misleading information when projects have very different costs and net earnings streams. An example from this study was that both the combined technician and dental nursing programs had payback period of four years (in the estimation of private returns using earning profile A). However, the programs differed markedly in their monetary returns since the earnings stream for the combined technician program was actually negative in the last ten years of working life.

(b) The internal rate of return provides a convenient statistic for a comparison with other studies or with the rate of return in other sectors of the economy. This largely explains why the internal rate of return has emerged as the most popular method in human capital studies. However, this method has a major weakness in that it can produce multiple rates of return in cases where the net earnings stream fluctuates between positive and negative. Despite this well recognized weakness, the internal rate has continued to receive much usage in the human capital studies. There appears to be an inherent assumption in much of the empirical work that the fluctuation of net earnings streams between positive and negative is very unlikely. However, this study revealed several cases where fluctuations did occur and, consequently, the internal rate of return method did not provide a meaningful measure of the monetary returns.

(c) The benefit/cost ratio method is particularly useful for establishing the rank order of investment projects. While the internal rate of return can also serve this function, the benefit/cost ratio has the advantage in that it can handle net earnings streams which fluctuate between positive and negative.

(d) The net discounted present value method has a unique strength among the four methods used in this study in that it is the only method which provides a measure of the dollar value of net benefits resulting from a project. A fundamental criticism of all of the preceding methods is that small projects with relatively high returns will be selected over larger projects with relatively low returns. The importance of this criticism was made evident in this study in the analysis of one and two year programs. Because of the difference in length, and accordingly in costs, the preceding three methods tended to provide more favourable evaluations of the monetary returns to one year programs than did the net discounted present value method. For instance, in the analysis of private monetary returns for 1976, the medical laboratory technology program had a payback period of four years, a benefit/cost ratio of 5.1 and an internal rate of return of 29.6 per cent. The dental nursing program had a payback period of four years, a benefit/cost ratio of 3.9 and an internal rate of return of 25.4 per cent. However the net discounted present values were $21,859 and $30,776 for the medical laboratory technology and dental nursing programs, respectively. These findings suggest that the net discounted present value method provides a very important supplement to the other approaches in a comparison of educational programs which differ substantially in cost.

IMPLICATIONS

The results of this study have implications for the administration of non-university health personnel training in the Province of Saskatchewan, salary determination in the health services sector, career counseling, and the human capital research program.

Administration of Health Personnel Training

The major implications for the administration of non-university health personnel training in the Province of Saskatchewan pertain to the allocation of resources, costs of training, planning approach, and career ladder programming.

Resource allocation. The results of the present study provide some indicators for the future allocation of resources among the health personnel training programs. However, the applicability of these indicators is dependent upon the degree to which the relationships between costs and earnings have remained consistent since the period covered by the present study. Moreover, as noted at the outset of the present study, resource allocation decisions should not be based solely on the monetary returns to training.

Specifically, the results of the present study suggest that:

(a) Investment in diploma nursing, psychiatric nursing, dental nursing and medical laboratory technology is attractive from both the social and private perspectives. Given the magnitude of the returns, an increase in resource allocation to produce more graduates would be appropriate. But, any increase in the level of graduates must also guard against the possibility of overproduction.

(b) Investment in the dental assistant and operating room nursing training programs is unattractive from both the social and private standpoints. Accordingly, a reduction in resource allocation to these programs to reduce the number of graduates would be appropriate.

(c) Given the inconsistent returns on investment for the health record administrator, nursing assistant and combined technician programs, further analysis should be undertaken to assess the post 1976 situation before any change is made in the level of resource allocation to these programs.

Costs of training. Three specific implications concerning the costs of training emerge from the findings of this study.

(a) The per student and per graduate costs of training in the duplicated programs (diploma nursing, nursing assistant and dental assistant) were generally substantially higher at Wascana than at Kelsey. This suggests that efforts might be directed towards reducing the educational institution costs on per student and per graduate bases at Wascana.

(b) Given the relatively large discrepancy between per student and per graduate costs, efforts might be directed at reducing the level of student attrition in health personnel training programs.

(c) A finding of this study was that tuition fee levels in the health personnel training programs were related neither to the costs of training nor to the returns on investment. This suggests that efforts might be directed towards establishing a systematic basis for setting tuition fee levels.

Planning approach. The results of the present study suggest that the heavy reliance on the manpower requirements planning approach for health personnel training may have contributed to an inefficient allocation of resources. Although, the manpower requirements approach should not be dismissed, there appears to be a need to supplement manpower planning information with other considerations. In particular, the costs of training and the relationship between these costs and the earnings of graduates warrant more serious attention.

Career ladder programming. Most of the training programs examined in ths study were designed to provide technically trained personnel for specific occupations. The earnings data imply that there is very little opportunity for advancement within some of these occupations. Consequently, attention might be directed towards more career ladder possibilities within the training programs. The intent of such possibilities would be to enable an individual to move from one occupational group to another with some additional training. In pursuing the additional training, the individual should be given advance credit for areas of demonstrated competency.

Salary Determination in the Health Services Sector

Seven of the 12 health personnel training programs included in this study generally had negative returns. The explanation for these negative returns in all cases, except operating room nursing, was that the maximum earnings of health personnel were less than the maximum earnings of the grade 12 reference group.

While the present study assumed that the earnings level reflected labour productivity, the negative return patterns raise questions in this regard. Given that virtually all of health personnel included in the present study were employed in the public sector, some of the effects of a monopsonistic (single-buyer) labour market may be present. Fleisher (1970:162) indicates that there is a tendency within such labour markets for wages to be lower than the value of marginal labour productivity. In effect, there may be insufficient competition within the health personnel labour market to ensure that salary levels are commensurate with labour productivities.

An implication arising from this study is that continued attention might be directed towards assessing the productivity of health personnel in the process of salary level determination. It is noteworthy that a "Job Evaluation Program" was underway in Saskatchewan hospitals for the period covered by this study. The results of that program led to substantially increased salary levels in 1978 for several occupational groups, including three which had negative returns in the present study; namely, health record administrators, nursing assistants and combined technicians.

Continuous monitoring of salary levels relative to labour productivity is essential to achieve an efficient allocation of resources among health personnel training programs. This type of monitoring is also essential in terms of future enrolment potential. Persistent imbalances between salary levels and labour productivity are likely to have a detrimental effect on the attractiveness of training to potential students.

Career Counseling

The results of the present study have two specific implications for career counseling.

1. There has been much emphasis in recent years on raising the level of career awareness among potential students. This has led to a substantial increase in the amount of career counseling information being produced and disseminated. In presenting earnings data, such literature tends to focus almost solely on starting salaries. However,

the results of this study suggest that starting salaries can be very misleading in terms of the long range earnings profile within an occupation. Programs which yielded negative monetary returns generally had attractive starting salaries in comparison to the reference group. But within five to ten years of employment, the salaries in these occupations began to lag behind the reference group. Consequently, greater efforts should be directed towards portraying longer range earnings profiles within career counseling literature.

2. The results of this study revealed that while the nursing assistant and dental assistant programs were not good financial investments for persons with a grade 12 level of education, these programs were good investments for persons with a grade 11 level of education. An important question from a career counseling standpoint is whether the entering grade 12 students were aware of their earnings potential with and without training.

Human Capital Research Program

The theory of human capital provided the analytical framework for the present study. According to this theory expenditures on education represent a form of investment because education leads to higher future earnings. While this is obviously a restricted view of education, numerous studies have generally confirmed the association between additional education and higher earnings.

A basic idea arising from this theory is that individuals choose education on rational economic grounds. The evidence of an association between additional education and higher earnings has frequently been used to suggest that individuals engage in a mental calculus in arriving at career decisions. However, some of the results in this study raise questions in this regard. Seven of the 12 training programs examined in this study had negative monetary returns. Thus, the behaviour of individuals who enrolled in those programs appeared to be inconsistent with the theory of human capital. Yet there are two plausible explanations, only one of which is damaging to the theory itself. The first explanation is that individuals were inadequately informed about future earnings prospects. This type of labour market imperfection may have led persons to enrol in the training programs with the expectation that their earnings would indeed be increased. The second explanation, and one that attacks the essence of the theory, is that persons were attracted to health personnel training largely for reasons other than the expectation of increased monetary returns.

Although the results of the present study raise some question about the appropriateness of the theory of human capital in explaining the behaviour of individuals, further research is necessary before conclusions can be reached in this regard. In particular, the two plausible explanations advanced herein would have to be formulated as hypotheses and subjected to an empirical test.

SUGGESTIONS FOR FURTHER RESEARCH

As a consequence of the present study, the following suggestions are put forth for further research:

1. Given the fact that the behaviour of individuals in seven of the 12 programs in this study appeared to be inconsistent with the theory of human capital, future research efforts might be directed towards assessing the appropriateness of using this theory as an analytical framework in post-secondary education. Specifically, hypotheses

might be formulated and tested to ascertain how well the theory of human capital explains the behaviour of individuals in particular post-secondary program areas.

2. The literature (Schultz, 1967:304; Blaug, 1970:171) pertaining to the theory of human capital suggests that individuals can realistically estimate only two points on lifetime earnings profile; namely, starting salaries and earnings at the age of about 45, being the typical age of their parents. The results of the present study suggest that observations of these two points may provide misleading information about the lifetime earnings profiles for females. In six of the programs yielding negative returns, observations at the two points may have resulted in a favourable impression of the lifetime earnings profile. Starting salaries were higher than for the reference groups. While maximum salaries lagged behind the reference group at age 45, the much higher labour force participation rate for health personnel effected higher average earnings than for the reference group. Future research efforts might be directed towards establishing the extent to which these two estimation points are used and the extent to which they provide misleading information to females.

3. The review of literature revealed very little work has been done to date in Canada on the returns to non-university education. While the present study provides some data in this regard, only the health personnel training area was examined. Similar studies in other program areas might be of value to guide resource allocation.

4. The present study revealed a fluctuation in rates of return during the three year period under review. While these results may have been a reflection of short term imbalances when assessed against longer term trends, there can be no assurance that rates of return remain constant over time. Given the results of this study and the current debate about the returns to education, efforts might be directed towards monitoring returns on a regular basis. This appears to be particularly important for Canada as the research efforts to date have been rather sporadic.

5. The results of this study suggest that returns to investment in females can no longer be left to *a priori* reasoning. The evidence of critical differences in monetary returns to females among programs and the trend of rising female labour force participation rates point to the need for a much greater emphasis on investment in females in the human capital research program.

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APPENDIX A

CORRESPONDENCE INITIATING THE STUDY

Appendix A.1

THE UNIVERSITY OF ALBERTA

Department of Educational Administration
EDMONTON, ALBERTA, CANADA T6G 2G5 TELEPHONE 432-5241

April 26th, 1978

Dr. A.J.Y. Guy
Deputy Minister
Department of Continuing Education
1855 Victoria Avenue
Regina, Saskatchewan

Dear Dr. Guy:

As you know, I am a doctoral student in Educational Administration at the University of Alberta. For my dissertation research, I am interested in undertaking an economic analysis of non-university health manpower training in Saskatchewan. This topic has been approved by the university. My research will be supervised by Dr. D. Friesen, Dr. D.M. Richards, and Dr. J.M. Small.

Specifically, the title of my proposed study is: The Monetary Costs and Benefits of Health Manpower Training. The study will include twelve non-university programs: (1) Diploma Nursing, KIAAS, (2) Diploma Nursing, WIAAS, (3) Psychiatric Nursing, (4) Dental Nursing, (5) Nursing Assistant, KIAAS, (6) Nursing Assistant, WIAAS, (7) Health Record Administration, (8) Medical Laboratory Technology, (9) Combined Technician, (10) Dental Assistant, KIAAS, (11) Dental Assistant, WIAAS, and (12) Operating Room Techniques.

The study will focus on three training years -- 1975, 1976, and 1977. There are two reasons for the choice of a three year analysis. First, generally there appears to have been changes in the demand for graduates in that period. Second, the Graduate Follow-Up Study System has only been in operation since 1975.

In terms of objectives, the study will examine both the costs and benefits of health manpower training. On the cost side, both direct instructional costs and indirect instructional costs (administrative overhead, central services, depreciation, etc.) will be considered. In addition, the foregone earnings of students will be taken into account. Basically, costs will be derived on three bases: (1) costs to the student (private costs), (2) costs to governments (direct public costs), and (3) costs to society (social costs). On the benefit side the study will be delimited to the monetary benefits in the form of salaries which accrue to the graduates as a result of training. For a more specific outline of the study, see Attachment #1 which presents the research questions to which the study is addressed.

The study I have outlined is very dependent on data from the Department of Continuing Education. Basically, I will require three types of data from the Department:

(1) Cost data - most of these data are likely available in the Department's Administrative Services Branch. However, it will likely be necessary to contact the Institutes directly regarding student costs and the pro-rating of indirect instructional costs.

(2) Student Assistance Data - from the Student Services Branch.

(3) Graduate Follow-Up Data - from the Graduate Follow-Up System.

Therefore, I am hereby requesting:

(1) Permission to undertake the study and

(2) Access to the required data.

I recognize that this is only a preliminary sketch of my proposed study and that you will likely have several questions. Since I intend to be in Regina in the near future, possibly we could further discuss the matter at that time.

Thank you for considering this request.

Sincerely,

Donald J Philippon

(Donald J. Philippon)

DJP/jm

cc. Mr. L.A. Riederer,
Assistant Deputy Minister
Operations Division

Dr. P.A.R. Glynn, Director
Policy Planning and Management
Information Systems Branch

Mr. F.C. May, Director
Administrative Services Branch

Departmental Advisors:

Dr. D. Friesen
Dr. D.M. Richards
Dr. J.M. Small

Appendix A.2

Province of Saskatchewan

DEPARTMENT OF CONTINUING EDUCATION
OFFICE OF THE DEPUTY MINISTER
1855 VICTORIA AVENUE
P.O. BOX 5070
REGINA, SASKATCHEWAN S4P 3R6

May 24, 1978.

Mr. Donald J. Philippon,
Department of Educational Administration,
The University of Alberta,
EDMONTON, Alberta.
T6G 2G5

Dear Mr. Philippon:

Thank you for your letter informing me of your proposed dissertation research. I can assure you that the Department of Continuing Education will be very interested in your economic analysis of non-university health manpower training in this province. In view of our interest, I am pleased to grant permission to you to undertake the study and to allow access to the required data.

In regards to procedures, I think it would be advisable for you to work directly with personnel in this Department who have the required data. To facilitate this, I would be prepared to issue a memorandum to supervisory personnel outlining your study and indicating my support for it. Possibly, you could meet with me to discuss the contents of such a memorandum.

I look forward to discussing the project further with you.

Yours sincerely,

A. J. Y. Guy,
Deputy Minister.

AJYG/ee

c.c. Mr. L. A. Riederer
Dr. P. A. R. Glynn
Mr. F. C. May
Dr. D. Friesen
Dr. D. M. Richards
Dr. J. M. Small

Appendix A.3

Government of the Province of Saskatchewan

DEPARTMENT MEMO

From A. J. Y. Guy, Deputy Minister,
Department of Continuing Education.

Date May 24, 1978.

Phone No. 565-5586

To (As listed below)

Your Ref.

Re Don Philippon's Doctoral Thesis

Our File

Mr. Don Philippon, Senior Research Officer for health and social service training programs in this Department, is working on a Ph.D. in Educational Administration. For his thesis, he is interested in undertaking an economic analysis of non-university health manpower training in Saskatchewan. Essentially, the study will look at the costs of training health workers in relation to the salaries paid to graduates. The study will consider all regular health science programs in the Institutes.

The study is very dependent on data from this Department. I have assured Mr. Philippon of access to the required data and of this Department's support of the study. I believe that the study will be particularly meaningful to the Department in that it examines a major training area. The study will also pull together much of our existing data - accounting data, student aid data, Canada Manpower course purchase data, and graduate follow-up data.

I have advised Mr. Philippon to work directly with the various Branches and Institutes in gathering his data. Much of the cost data will have to be obtained at the Institutes. I urge your cooperation with his study.

Mr. L.A. Riederer
Mr. R. Barschel
Dr. P.A.R. Glynn
Mr. F. May
Mr. W. Schneider
Mr. D. McGuigan
Mr. M. Campbell
Mr. W. Berg
Mr. K. Gunn
Mr. G. Brown
Mr. J. Gibson
Mr. R. Meyer
Mr. Ron Sauer
Miss W. Matheson

APPENDIX B

CORRESPONDENCE REGARDING SPECIFIC DATA REQUESTS

Appendix B.1

July 26, 1978.

Census Information Service,
Statistics Canada,
OTTAWA, Canada.
K1A 0T6

Dear Sir or Madam:

Further to telephone conversations with Mr. Howard Leigh and Mr. Colin Geitzler, I am now submitting a formal request for a special run on the 1971 Census data. This request is designed to provide data for an economic analysis of selected post-secondary programs which I am conducting.

Specifically, I would like to obtain mean (average) employment income and the distribution of employment income for Saskatchewan residents who had a grade XI level of education. I also would like to obtain the same data for residents with a grade XII level of education. The table formats are attached.

I would like the following controls used in the analysis:

(1) Level of education

- restrict the first analysis (Tables 1-3) to persons whose highest grade attended was grade XI and who did not have any additional education or training. Also, ensure that persons did not have less than grade XI as the highest grade attended.
- restrict the second analysis (Tables 4-6) to persons whose highest grade attended was grade XII or grade XIII, in the case of persons educated in Ontario, and who did not have any additional education or training. Again, please ensure that persons did not have less than these specified levels of education.

. . . 2

(2) Employment income - exclude persons who worked in 1970 but who did not report employment income.

(3) Age categories - provide aggregations for the following age categories:

15-19
20-24
25-29
30-34
35-39
40-44
45-54
55-64
65 & Over

(4) Sex breakdown - provide an analysis on the basis of the total defined population plus a breakdown by sex.

(5) Class of worker - for each level of education, provide a breakdown by class of worker - ((i) wage earners, (ii) self-employed workers) plus an analyses for all classes considered together.

(6) Full-time/Full year - consider only persons who worked on a full-time full year basis in 1970.

I understand that upon receiving this request a written agreement will be sent to me for signature and that this agreement will include a price quotation. I would also appreciate being informed as to when I might expect receiving the results.

Should there be aspects requiring further clarification for the purposes of programming, please notify me. I can be reached at (306) 565-5609.

Thank you for considering this request.

Sincerely,

Donald J. Philippon,
Senior Research Officer.

DJP:ee

Att.

c.c. Mr. Ron McMahon

Note. The response to this request was in the form of a computer printout. A summary of the data is presented in the text of the thesis.

Appendix B.2

Saskatchewan

Saskatchewan
Continuing Education

Student Services
Branch

1855 Victoria Avenue
Regina, Canada
S4P 3V5

November 15, 1978.

Mr. Donald J. Philippon,
Department of Educational Administration,
The University of Alberta,
EDMONTON, Alberta.
T6G 2G5

Dear Mr. Philippon:

Re: Your Request for Student Aid Data

In response to your inquiry regarding student assistance from 1975 to 1977, I am pleased to supply the following:

1. Average assistance authorized as stated in the 1976-77 Annual Report, Saskatchewan Student Aid Fund.

	C.S.L.	S.S.B.
1974-75	$ 975	$342
1975-76	$ 933	$455
1976-77	$1,032	$490

2. In the years 1975 to 1977 no detailed record was kept as to amounts of assistance issued to students in institutes or universities or in respect to specific courses. The assistance authorized is based on assessed need. It has been the experience of this Branch that need for students in a specific area of study deviates by less than 2 per cent from the average for all students. It has also been the experience of this Branch that 10 month institute courses and 8 month university courses provide the same assessed need as lower institute fees are balanced by the extra months of living allowances. A sample of 1976-77 and 1977-78 applications has been reviewed to verify this matter.

. . . 2

3. In respect to the numbers of students who receive loan and/or bursary assistance compared to the total eligible student population, I find the following:

	Loan Assistance	Bursary Assistance
1974-75	32.4%	23.2%
1975-76	30.6%	19.6%
1976-77	28.3%	22.1%

(Based on 1976-77 Annual Report, Student Aid Fund)

This percentage applies to total post-secondary student population. A brief review of assistance applications indicates that these percentages are similar for universities and institutes and for different programs.

4. Students who receive Canada Student Loans are not required to pay interest on the loan while they attend or for a six month period following completion of the program or discontinuing their program. The interest rate is set according to the Regulations under the Canada Students Loan Act and is 1 per cent above the base rate set by the Minister of Finance calculated on a formula involving the market yields of Government of Canada bonds.

The rates were as follows:

1974	9 per cent
1975	8 1/4 per cent
1976	9 7/8 per cent
1977	9 per cent

I trust this information is what you require. Please do not hesitate to contact me if you require further clarification or information.

Sincerely,

Morris Campbell

Morris Campbell,
Director.

Appendix B.3

August 3, 1978. Our File: 13.2.19

Mr. Frank Bessier,
Chief Economist,
Employment and Immigration Commission,
800 - 2101 Scarth,
REGINA, Saskatchewan.

Dear Mr. Bessier:

Further to our conversation, this is to request specific data for my economic analysis of non-university health manpower training in Saskatchewan.

As I mentioned to you, my study includes six training programs in which trainees were eligible for support under CMTP. The study looks at three years, 1974-75, 1975-76, and 1976-77.

One component of the cost analysis is the amount paid in terms of training allowances to CMTP trainees. Specifically, I would like to receive the following data for each of the courses included in the study.

(1) Number of trainees supported for total course.

(2) Number of trainees supported for part of the course.

(3) Total amount paid in:

   (i) travelling allowances;

   (ii) commuting allowances;

   (iii) living allowances.

Attached is the table format for the data I am requesting. Should any clarification be needed, do not hesitate to contact me.

. . . 2

Also, I would be interested in any reports that the Employment and Immigration Commission may have prepared in the area of cost benefit analysis.

Thank you.

Sincerely,

Donald J. Philippon,
Senior Research Officer.

DJP:ee

Att.

Note. Response to this letter was in the form of a computer printout. A summary of the data is presented in text of thesis.

Appendix B.4

Province of Saskatchewan

DEPARTMENT OF FINANCE

REFER TO FILE

October 5, 1978

Mr. Don Philippon
Research Officer
Department of Continuing
Education
1855 Victoria Avenue
Regina, Saskatchewan

Dear Mr. Philippon:

Re: Province of Saskatchewan - Financing

For your information, I am providing details of monies borrowed by the Province for the years requested.

Amount: $45,000,000
Date of Issue: 1974
Maturity Date: December 2, 1999
Coupon Rate of Interest: 10%

Amount: $70,000,000
Date of Issue: 1975
Maturity Date: November 3, 2000
Coupon Rate of Interest: 9 7/8%

Amount: $75,000,000
Date of Issue: 1976
Maturity Date: April 1, 2001
Coupon Rate of Interest: 10 1/4%

Amount: $75,000,000
Date of Issue: 1977
Maturity Date: February 1, 2002
Coupon Rate of Interest: 9%

I trust the above information will be sufficient for your purposes.

Yours truly,

M. I. Meiklejohn

MIM/sdb

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REGINA

Appendix B.5

CITY OF REGINA
P.O. BOX 1790 • REGINA, SASK. • S4P 3C8

December 5, 1978.

Mr. Donald J. Philippon,
P.O. Box 419,
LUMSDEN, Saskatchewan.
SOG 3C0

Dear Sir:

Re: Value of Tax Exemption for Wascana Institute (Parkway Campus)

We have your letter of November 29, 1978. In regard to the above, I wish to confirm your figures in the following manner:

Year	Total Assessment*	Mill Rate	Value of Exemption (Tax Dollars
1974	332,710	126.5	$42,088.
1975	332,710	144.5	48,077.
1976	332,710	166.5	55,396.
1977	332,710	190.5	63,381.
1978	332,710	196.5	65,377.

*Buildings are assessed at 222,710; land assessed at $5,000 per acre, for your portion of 22 acres giving you an assessment of $110,000.

Trusting this is the information you require.

Yours truly,

F.E. Robb,
Acting Director of Assessment.

FER:ee

Appendix B.6

THE CITY OF SASKATOON
SASKATCHEWAN
S7K 0J5
OFFICE OF THE CITY ASSESSOR

CITY ASSESSOR
CITY HALL
PHONE 244-1761

December 6, 1978

Mr. Donald J. Philippon,
Box 419,
Lumsden, Sask.
S0G 3C0

Dear Sir:

Re: Kelsey Institute
1110 Idylwyld Drive
Saskatoon, Sask.

The enclosed statistical information re the above property is identical to the information contained in the assessment records for the City of Saskatoon.

Yours truly,

R.K. Bird,
City Assessor

FBG:bp
Enc. (1)

IMPUTED VALUE OF PROPERTY TAX EXEMPTIONS

KELSEY INSTITUTE

Year	Mill Rate (Public School Supporters)	Assessment* Kelsey Institute Less Swimming Pool	Value of Property Tax Exemption
1974	88.56	3,427,270	$303,519
1975	99.92	3,427,270	$342,453
1976	106.52	3,427,270	$365,073

*Buildings assessed at $3,076,870 and Land assessed at $350,400. Assessments exclude swimming pool.

Appendix B.7

Government of Saskatchewan

Memorandum

From Payment Negotiation Unit.

Date March 14, 1979

Phone

To Donald J. Philippon, Senior Branch Officer,
Policy Planning Branch,
Department of Continuing Education.

Your File

Re Coverage of Collective Bargaining Agreements

Our File

In response to your enquiry of February 28th, we have reviewed the identified areas. While the following are estimates, we believe they would not be inaccurate to any major extent.

(1) 98%
(2) 100%
(3) the Province would be the major employer and 100% would be covered.
(4) 75%
(5) 95%
(6) the Province employs some 225 C.D.A.'s - all would be unionized. It is probable that a significant number are employed by dentists and would not be unionized.
(7) 90%
(8) 95%
(9) 100%

I hope the foregoing will be of assistance to you. Please call if there are any questions.

Brian Topp,
Director.

BT/eh

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EDUCATION
REGINA

Appendix B.7

Donald J. Philippon, Senior Research Officer,
Policy Planning Branch,
Department of Continuing Education.

February 28, 1979

Mr. Brian Topp, Payment Negotiating Unit,
Saskatchewan Department of Health.

Coverage of Collective Bargaining Agreements

13.2.19

I am currently undertaking an economic analysis of non-university health manpower training in the Province of Saskatchewan as a doctoral thesis. One component of my study concerns the earnings of persons in the following occupational groups:

(1) Registered Nurses;
(2) Registered Psychiatric Nurses;
(3) Dental Nurses;
(4) Health Record Administrators (Medical Record Librarians);
(5) Certified Nursing Assistants;
(6) Certified Dental Assistants;
(7) Medical Laboratory Technologists;
(8) Combined Laboratory & X-Ray Technicians; and
(9) Operating Room Nurses.

Would it be possible for you to give me some indication as to what proportion of the population in each of the above groups would be covered by collective bargaining agreements in this Province. My intention is to use salary scales from the various collective bargaining agreements to derive earnings profiles. The validity of this approach can only be ascertained by some knowledge as to what proportion of the membership in each occupational group actually works under a collective bargaining agreement.

My impression is that the majority of workers in all of the above groups with the exception of Dental Assistants would be working under a collective bargaining agreement. I would greatly appreciate any comments and evidence that you can provide on this matter.

Thank you.

Don Philippon

DJP/ee

APPENDIX C

BRIEF DESCRIPTION OF THE HEALTH PERSONNEL TRAINING PROGRAMS

BRIEF DESCRIPTION OF THE HEALTH PERSONNEL TRAINING PROGRAM

The following presents a brief description of each of the health personnel training programs included in this study. Enrolment and graduation data for these programs are presented in Appendix D.

Diploma Nursing Kelsey

The diploma nursing program at Kelsey is two training years in length. Upon completion of the program graduates, are eligible to write examinations administered by the Saskatchewan Registered Nurses' Association (SRNA). Successful candidates on these examinations are registered with the S.R.N.A. and, accordingly, are known as registered nurses (R.N.).

Diploma Nursing Wascana

The description of the Kelsey program also applies to the Wascana program. However, the program offered at the health sciences division of Wascana does differ from the Kelsey program in terms of the structuring of learning activities. A core curriculum approach is used at Wascana Institute whereby first year diploma nursing, first year psychiatric nursing and nursing assistant students share a virtually common year.

Psychiatric Nursing

The psychiatric nursing program offered at the health sciences division at Wascana is two training years in length. Upon completion of the program, graduates are eligible to write examinations for registration with the Saskatchewan Psychiatric Nurses Association (S.P.N.A.). Successful candidates who become registered are known as Registered Psychiatric Nurses (R.P.N.).

Dental Nursing

The dental nursing program offered at the dental division of Wascana is virtually unique in North America. The two year program prepares persons to provide specific restorative and preventive dentistry services. The program was established in 1972 to provide personnel for the Saskatchewan government's dental plan for school children. Upon completion of the program, graduates are licensed with the Dental Nurses' Board.

Health Record Administrator

The health record administrator program offered at the health sciences division of Wascana is two training years in length. Since 1976, two related programs have been offered under the general label of health record technology: health record administrator and health record technician. The health record administrator program, which existed by itself prior to 1976 and was called the medical record librarian program, is of two years in length. The health record technician program is essentially an option whereby a student can graduate in one year. Initially in year one, both groups of students are enrolled in the same courses but students choosing the technician option are exposed to different learning activities towards the end of the year. Only the health record administrator program component was included in this study.

Nursing Assistant Kelsey

The nursing assistant program offered at Kelsey consists of one training year. However, in each year there is more than one intake. In 1974, there were three groups enrolled. In the latter two years of the study only two groups were enrolled per year. Upon completion of the program, graduates are eligible to write certification examinations administered by the S.R.N.A. Successful candidates become known as certified nursing assistants (C.N.A.).

Nursing Assistant Wascana

The nursing assistant program offered at the health sciences division at Wascana is one training year in length. There is only one intake of students per year. The certification process, as described for Kelsey, also applies for the Wascana program. The two programs differ in the structuring of learning activities. The program at Wascana is part of a core year as explained above in the discussion of the diploma nursing program at Wascana.

Dental Assistant Kelsey

The dental assistant program at Kelsey is one training year in length. Upon completion of the program, graduates are eligible for certification with the College of Dental Surgeons of Saskatchewan. Persons receiving such certification are known as certified dental assistants (C.D.A.).

Dental Assistant Wascana

The description of the Kelsey program also applies to the program offered at the dental division of Wascana. The Wascana program started in 1975. There is some sharing of staff and facilities between the dental assistant and dental nursing programs.

Medical Laboratory Technology

This program involves one training year at Kelsey. Upon completion of the Kelsey program, graduates are eligible for a one year hospital placement during which time they receive a salary. After completing the hospital placement year, these persons are eligible to write the examinations set by the Canadian Society of Laboratory Technologists to obtain the Registered Technician (R.T.) designation. Only the Kelsey year is considered training in this study. The hospital placement year is considered to be the first year of earnings.

Combined Technician

The combined technician program, formerly known as the clinical laboratory and x-ray program, is one training year in length. Graduates of this program are known as certified combined technicians.

Operating Room Nursing

The operating room nursing program offered at the health sciences division at Wascana is one semester (18 weeks or about one half a regular training year) in length. Only registered nurses are accepted into the program. The program is one of two components of training offered under the label of operating room nursing and techniques. The other program component, not included in this study, is the operating room technician program which is open to certified nursing assistants.

APPENDIX D

ENROLMENT AND GRADUATION STATISTICS

Table 46

Number of Enrollees and Graduates

Two Year Programs

	1974		1975		1976	
	Enrolment[a]	Corresponding Graduates[b]	Enrolment[a]	Corresponding Graduates[b]	Enrolment[a]	Corresponding Graduates[b]
Diploma Nursing Kelsey						
1st Year	280	215	283	270	240	167
2nd Year	252	238	225	215	225	220
Total	532	453	508	435	465	387
Diploma Nursing Wascana						
1st Year	174	134	169	122	152	125
2nd Year	151	121	158	134	147	122
Total	325	255	327	256	299	257
Psychiatric Nursing						
1st Year	107	37	109	52	74	43
2nd Year	64	58	35	37[d]	56	52
Total	171	95	144	89	130	95
Dental Nursing						
1st Year	60	52[c]	79	66	97	77
2nd Year	56	55	64	64	67	66
Total	116	107	143	130	164	143
Health Record Administrator						
1st Year	13	7	15	10	12	9
2nd Year	11	10	7	7	11	10
Total	24	17	22	17	23	19

Source. Department of Continuing Education.

[a] Represents initial enrolment in programs.

[b] Represents the number of graduates corresponding with the particular enrolled group shown. In the case of first year enrolment, the graduation occurs one year in the future. The designation of the corresponding groups is in terms of time only, not on an individualized basis. Persons entering 1st year in 1974 would graduate in 1975 and so on.

[c] The corresponding set of graduates for the intake occurs in 1975 when there were 64 graduates. However 12 of the graduates in 1975 were a special intake of Dental Hygienists who entered directly into the second year. Therefore, only 52 graduates corresponded to the 1974 first year intake of 60.

[d] The number of graduates (37) exceeds the initial year enrolment (35) because there was no attrition in year 2 and two late enrollees also went on to graduate.

Table 47

Number of Enrollees and Graduates
One Year or Less Programs

Program	1974		1975		1976	
	Enrolment[a]	Graduates[b]	Enrolment[a]	Graduates[b]	Enrolment[a]	Graduates[b]
Nursing Assistant Kelsey	223	185	175	163	197	174
Nursing Assistant Wascana	98	79	92	78	82	73
Dental Assistant Kelsey	80	64	81	60	64	51
Dental Assistant Wascana	c	c	61	60	58	51
Medical Lab. Technology	85	60	99	78	66	55
Combined Technician	25	17	45	35	44	37
Operating Room Nursing	7	6	10	10	9	7

Source. Department of Continuing Education.

[a] Represents the initial enrolment in programs.

[b] Represents the number of graduates corresponding to the enrolment intake in the year.

[c] The program was not in operation.

Table 48

Age Distribution of Health Science Students
and Average Age of Graduates
1976

Program	Enrolment Distribution by Age Category (Percentages)[a] 19 and Over	20 to 29	Over 30	Not Specified	Average Age of Graduates
Diploma Nursing Kelsey	57.1	34.7	2.2	6.0	21.8[b]
Diploma Nursing Wascana	47.9	36.3	6.9	9.1	21.8[b]
Psychiatric Nursing	54.9	38.6	3.7	3.0	22.0
Dental Nursing	59.3	33.4	1.9	5.6	21.4
Health Record Administrator	53.3	40.0	6.7	0.0	23.4
Nursing Assistant Kelsey	49.7	46.1	1.9	2.5	22.2[b]
Nursing Assistant Wascana	38.2	41.9	11.9	8.2	22.2[b]
Dental Assistant Kelsey	57.9	40.7	0.0	1.6	20.3[b]
Dental Assistant Wascana	72.0	19.3	0.0	8.8	20.3[b]
Medical Lab. Technology	70.0	21.5	2.9	5.8	20.1[c]
Combined Technician	58.9	26.5	3.0	11.8	20.6
Operating Room Nursing[d]	0.0	79.2	12.5	8.4	24.9

Source. Enrolment distribution was obtained from Department of Continuing Education's Student Information System - Summary Tables (May 1978). Average age of graduates was obtained from the Department of Continuing Education's Graduate Follow-Up Study, First Follow-Up of the 1977 Health Sciences Graduates (March, 1978).

[a] Percentages may not add to 100 per cent due to rounding error.

[b] Duplicated programs were combined in the source data so only one average age for all students was available.

[c] The source data actually showed 21.1, but these graduates, unlike the graduates from other programs, were surveyed one year after their graduation from the Institute program.

[d] The data on this program included both the operating room nursing and operating room technician programs.

Table 49

Percentage of Health Science Graduates Who Were Females

Program	Year of Graduation		
	1974	1975	1976
Diploma Nursing[a]	98.6	99.7	97.8
Psychiatric Nursing	88.6	93.3	85.4
Dental Nursing	100.0	98.1	98.4
Health Record Administrator	100.0	100.0	100.0
Nursing Assistant[a]	93.5	97.3	98.0
Dental Assistant[a]	100.0	99.0	100.0
Medical Lab. Technology	93.0	95.1	95.0
Combined Technician	93.3	94.3	97.1
Operating Room Nursing	b	b	100.0[c]
All Programs	96.7	98.2	97.4

Source. Department of Continuing Education, Graduate Follow-Up Studies, First Follow-Up reports on Health Science Students for 1975, 1976 and 1977.

[a] Programs at both Institutes combined.

[b] Not included in survey.

[c] Operating room nursing and operating room technician combined.

Table 50

Percentage of Students Having Grade 12 in
Grade 11 Prerequisite Programs
1975

Program	Percentage
Nursing Assistant Kelsey	83.2
Nursing Assistant Wascana	86.8
Dental Assistant Kelsey	91.4
Dental Assistant Wascana	90.0

Source. Department of Continuing Education, Student Information System

APPENDIX E

DISCUSSION OF STUDENT ATTRITION AND THE DERIVATION OF PER GRADUATE COSTS IN TWO YEAR PROGRAMS

DISCUSSION OF STUDENT ATTRITION AND THE DERIVATION OF PER GRADUATE COSTS IN TWO YEAR PROGRAMS

Attrition in Two Year Programs

An analysis of student attrition in two year programs is presented in Table 51. Attrition was defined as the difference between initial enrolment and the number of persons completing the year. The attrition rate was this difference divided by the initial enrolment and then multiplied by 100.

Table 51 provides an account of attrition by year of the program. The dominant pattern was for most attrition to occur in year one; in fact, very low attrition rates existed in year two for most programs. Diploma nursing at Wascana was somewhat of an exception, but even there the attrition rate was higher in year one than in year two.

Derivation of Per Graduate Costs

The total costs for three cost components in this study, namely, net foregone earnings of students, government subsidies to students and student educational costs were dependent on the number of students enrolled. Also, net educational institutional costs were affected in the same way as the amount of tuition fee revenue was dependent on the number of students.

The initial calculation of total social costs in this study was made using the initial enrolment in the training programs. To derive per student costs, the total social cost was divided by the initial enrolment. Since this represented the per student cost for one year, this cost was then doubled to provide the per student cost for the two year program.

In calculating per graduate costs, the intent was to attribute all the costs of training to those students who graduated. However, students who dropped out did not incur certain costs for an entire two year period. Consequently, the initial total social cost could not simply be divided by the number of graduates. Instead adjustments were necessary for those cost components which were a function of enrolment. A revised total social cost was then calculated.

The analysis of attrition revealed that most of the student attrition or drop out occurred in the first year. Consequently, the adjustment factor used in this study was based on the assumption that students who dropped out would have only paid tuition fees for one year, lost earnings for one year, and incurred other direct educational costs for one year. The adjustment factor was derived as follows:

$$\text{Adjustment Factor} = \frac{a + \frac{b}{2}}{c}$$

where: a = number of graduates

b = difference between the initial enrolment and and the corresponding number of graduates (or student attrition

c = initial enrolment

As an illustration, the adjustment factor for diploma nursing Kelsey for 1974 was derived as follows:

$$\frac{453 + \frac{79}{2}}{532} = .9258$$

The adjustment factor for each program by year are presented in Table 52.

The adjustment factor was then applied against those social cost components which were a function of enrolment. The initial calculations, which were based on initial enrolment, were multiplied by this factor to derive a revised total for each of these cost components. A revised total social cost was then computed by adding together the revised totals for the cost components.

Once the revised social cost was determined, the per graduate cost was calculated by dividing this revised total by the number of graduates. Since this reflected the per graduate cost for only one year, the cost was then doubled to provide per graduate cost for the two year program.

Table 51

Attrition Rates in Two Year Programs

Program Training Year	Year One			Year Two		
	Initial Enrolment	Completed Year	Attrition Rate (%)[a]	Initial Enrolment	Completed Year[b]	Attrition Rate (%)[a]
Diploma Nursing Kelsey						
1974	280	225[c]	19.7	252	238	5.6
1975	283	225[c]	20.5	225	215	4.5
1976	240	189[c]	21.3	225	220	2.2
Diploma Nursing Wascana						
1974	174	127[d]	27.0	151	121	19.8
1975	169	123[d]	27.2	158	134	15.2
1976	152	119[d]	21.7	147	122	17.0
Psychiatric Nursing						
1974	107	31	71.0	64	58	9.4
1975	109	55	49.5	35	37	0.0
1976	74	48	35.1	56	52	7.1
Dental Nursing						
1974	60	53	11.7	55	54	1.8
1975	79	69	12.7	63	63	0.0
1976	94	81	7.7	67	66	1.5
Health Record Administrator						
1974	13	7	46.2	11	10	9.1
1975	15	10	33.3	7	7	0.0
1976	16	10[e]	37.5	11	10	9.1

Source. Registrars, Kelsey and Wascana Institutes.

[a] Attrition rate was calculated by dividing the difference between initial enrolment and the number completing the year by the initial enrolment and then multiplying by 100 to express as a percentage.

[b] The number completing the year in this case refers to the number of graduates.

[c] Refers to the number of students who started year two in the following year.

[d] Because of the transfer situation which existed in this program, the number actually completing the year was reduced by the number of transfers into the program.

[e] In this year most of the students who discontinued went into the health record technician option which was available for the first time. Nevertheless, these students did drop out of the two year program.

Table 52

Adjustment Factors Used in Deriving Revised Social Costs in Two Year Programs For the Per Graduate Cost Calculations

Program	Year 1974	 1975	 1976
Diploma Nursing Kelsey	.9258	.9282	.9162
Diploma Nursing Wascana	.8923	.8915	.9298
Psychiatric Nursing	.7778	.8091	.8654
Dental Nursing	.9612	.9514	.9360
Health Record Administrator	.8542	.8864	.9131

APPENDIX F

DISCUSSION OF THE USE OF THE INDUSTRIAL COMPOSITE INDEX

DISCUSSION ON THE USE OF THE INDUSTRIAL COMPOSITE INDEX TO ADJUST SALARIES

An index to adjust salary data was required in the derivation of net foregone earnings of students and in computing the age-earnings profiles for the reference groups. The adjustment was required because the only source of age-earnings data, cross-classified by sex and educational level, was the 1971 Census of Canada. The earnings data from that source were for 1970 whereas the focal years for the present study were 1974, 1975 and 1976.

The Industrial Composite Index of average weekly wages and salaries was used to adjust the earnings data. The value of the index for selected years and the percentage increases over 1970 are shown in Table 53.

The use of the Industrial Composite Index was critically assessed in terms of its appropriateness for this study. The following describes the nature of the index and how it was assessed.

Nature of the Index

The Industrial Composite Index is based on the Monthly Employment, Payroll and Manhours Survey conducted by Statistics Canada. The survey is designed to measure the month-to-month trends for the commercial sector of the economy with the exclusion of agriculture, fishing and trapping. By definition, such non-commercial sectors as education, health and welfare services, religious organizations, private households, public administration and defense are excluded. Moreover, the survey is limited to larger firms which generally means firms with 20 or more employees.

Appropriateness of the Index For The Present Study

At the outset it must be recognized that while the present study focuses on health personnel training, an index was not necessary to adjust the salaries of health workers. Instead, the index was necessary to adjust the salaries for the reference groups. Moreover, the reference groups did not consist of persons in any one type of occupation; rather, all types of occupations occupied by females with the given education and age characteristics were involved. Thus the exclusion of health services in the Industrial Composite Index was not a serious concern to this study.

Nevertheless, there are three areas where use of the Industrial Composite Index might be questioned. First, there is the exclusion of public sector employment. Second, farm workers are excluded. Third, the Index is based only on large firms. The central question to this study was whether the Industrial Composite Index accurately reflected the general movement in wages and salaries even though it had these limitations in scope. An assessment was possible with regard to public sector employment and farm wages.

With regard to the public sector employment, data were available from the Government of Saskatchewan. Special tabulations using the same data as in the derivation of the Industrial Composite Index were available. These tabulations separated the Industrial Composite into two components - goods producing and service producing. (An estimated amount for fringe benefits was included over the industrial composite data.) In addition, a public services category, not present in the Industrial Composite, was included in the special tabulation. As evident from Table 54, the movement in salaries and wages in public services closely matched the situation in those industries covered by the Industrial Composite Index. Thus, it was concluded that the Industrial Composite Index adequately reflected the situation for public services.

The exclusion of farm wages in the Industrial Composite Index was not regarded as a serious concern because a very small proportion of females are employed as farm wage earners in Saskatchewan. This is an important point because the index was only used in this study to adjust the salaries of female wage earners. According to Statistics Canada's Labour Force Survey data, only between 14 and 16 per cent of employed females were employed in agriculture in Saskatchewan between 1975 and 1977 (Statistics Canada: 1976a, Table 45; 1976b, Table 50; 1977b, Table 57). Moreover, when only wage earners are considered, the proportion is much smaller. In fact, only between 17 and 19 per cent of the females employed in agriculture were paid workers (Statistics Canada: 1976a, Table 49; 1976b, Table 54; and 1976b, Table 55).

Table 55 presents percentage increases in farm wages as compared to the Industrial Composite Index. Clearly, farm wages increased at a faster rate than did wages in the sectors covered by the index. However, because of the very small proportion of females employed in agriculture as wage earners, the Industrial Composite Index was considered appropriate for salary adjustments in this study.

The extent to which the Industrial Composite Index reflected the wage movements in small firms in Saskatchewan could not be checked given the absence of the required data. The assumption was made that wages in the smaller firms did follow the situation in the larger firms.

Having carried the assessment of the Industrial Composite Index as described above, it was concluded that the Index was appropriate for adjusting wages and salaries in this study.

Table 53

Industrial Composite Index for Saskatchewan Showing Percentage Increases Over 1970

Year	Index	Percentage Increase over 1970
1961	100	
1970	114.87	
1974	160.92	40.0
1975	188.31	63.9
1976	214.87	87.1

Source. Statistics Canada, Catalogue No. 72-201.

Table 54

Average Annual Wages, Salaries and Supplementary Income and Percentage Increases over 1970

Industry Category	1970 $	Year 1974 $	1974 Increase Over 1970	1975 $	1975 Increase Over 1970	1976 $	1976 Increase Over 1970
Goods Producing[a]	7,399	10,752	+45.4	12,975	+75.4	14,694	+98.6
Service Producing[b]	4,766	6,748	+41.6	7,996	+67.8	9,285	+94.9
Public Services[c]	5,843	8,511	+45.7	9,796	+67.7	11,394	+95.0

Source. Government of Saskatchewan, Executive Council, Planning and Research, Correspondence dated December 15, 1978.

[a] Corresponds to the Mining, Manufacturing, Construction and Transportation categories covered by the Industrial Composite Index.

[b] Corresponds to the Trade, Finance, Insurance, Real Estate, and Service categories covered by the Industrial Composite Index.

[c] Includes employment within the three levels of government plus non-commercial services.

Table 55

Percentage Increase in Average Monthly Wages of Farm Help in Saskatchewan (Without Board) Compared to Industrial Composite Index

Year	Average Farm Wages	% Increase Over 1970	% Increase In Industrial Composite Index Over 1970
1970	$292		
1974	$477	+63.4	40.0
1975	$562	+92.5	63.9
1976	$617	+111.3	87.1

Source. Average farm wages obtained from Statistics Canada. *Farm Wages in Canada* (Catalogue No. 21-002), August 1976. The source of data for the Industrial Composite Index was the same as noted in Table 53.

APPENDIX G

AGE-EARNINGS DATA FOR THE GRADE 12 AND GRADE 11 REFERENCE GROUPS

Table 56

Estimated Gross Earnings of Saskatchewan Females with a Grade 12 Level of Education Working on a Full-Time Full-Year Basis by Age Category and Year

	Year			
Age Category	1970	1974	1975	1976
15 - 19	$2,642	$3,699	$4,330	$4,943
20 - 24	4,222	5,911	6,920	7,899
25 - 29	5,427	7,598	8,895	10,154
30 - 34	5,755	8,057	9,432	10,768
35 - 39	5,841	8,178	9,573	10,929
40 - 44	5,965	8,351	9,777	11,161
45 - 54	5,997	8,396	9,829	11,220
55 - 64	6,198	8,678	10,159	11,596
65 or Over	5,174	7,244	8,480	9,681

Source. The 1970 earnings were obtained from a special tabulation of the 1971 census. The earnings for 1974, 1975 and 1976 were derived by adjusting the 1970 earnings upwards using the Industrial Composite Index.

Table 57

Estimated Gross Earnings of Saskatchewan Females with a Grade 11 Level of Education Working on a Full-Time Full-Year Basis by Age Category and Year

	Year			
Age Category	1970	1974	1975	1976
15 - 19	$2,277	$3,188	$3,732	$4,260
20 - 24	3,417	4,784	5,600	6,393
25 - 29	4,119	5,767	6,751	7,707
30 - 34	4,202	5,883	6,887	7,862
35 - 39	4,138	5,793	6,782	7,742
40 - 44	4,251	5,951	6,967	7,954
45 - 54	4,254	5,956	6,972	7,959
55 - 64	4,461	6,245	7,312	8,347
65 or Over	3,782	5,295	6,199	7,076

Source. The 1970 earnings were obtained from a special tabulation of the 1971 census. The earnings for 1974, 1975 and 1976 were derived by adjusting the 1970 earnings upwards using the Industrial Composite Index.

APPENDIX H

INCOME TAX ADJUSTMENT

INCOME TAX ADJUSTMENT

Both before-tax and after-tax earnings were required in the study. Before-tax earnings were used in the social return calculations and after-tax earnings were necessary for the private return calculations. Only income tax was considered in deriving the after-tax earnings.

Rather than derive numerous tax adjustments to reflect varying personal circumstances (e.g., single, married and married with dependents), the approach adopted herein was to derive the average income tax paid by income class. This was the same approach as that adopted by Stager (1968). Three steps were involved in deriving the appropriate income tax adjustment:

1. The average federal tax payable by income class was calculated, using Revenue Canada's Taxation Statistics for 1974, 1975 and 1976. In essence, this amount represented the average amount paid by all workers in the income class.

2. The corresponding provincial tax payable was then derived using the tax tables.

3. The average federal tax paid and the provincial income tax payable were added together to derive average total income tax. Table 58 provides a sample of the tax calculations for each year of the study.

Table 58

Income Tax Calculations: A Sample

Year	(1) Income Class	(2) Federal Tax Paid	(3) Number of Persons	(4) Average Federal Tax Paid	(5) Corresponding Provincial Tax	(6) Average Total Income Tax
1974	3,800- 3,900	$ 6,000,000	70,142	$ 86	$ 94	$ 180
	5,500- 6,000	$136,200,000	406,445	$ 335	$194	$ 529
	9,000- 9,500	$284,300,000	314,111	$ 905	$422	$1,327
1975	4,000- 4,500	$ 16,700,000	220,100	$ 76	$ 10	$ 86
	7,500- 8,000	$192,400,000	352,559	$ 546	$198	$ 744
	9,000- 9,500	$248,700,000	316,446	$ 786	$294	$1,080
1976	5,000- 5,500	$ 36,700,000	251,167	$ 146	$ 38	$ 184
	11,000-12,000	$572,300,000	531,274	$1,077	$410	$1,487
	12,000-13,000	$631,800,000	503,033	$1,256	$482	$1,738

Sources.

Columns 1 to 4: Revenue Canada Taxation Statistics, 1976, 1977 and 1978 editions (which provide taxation data for 1974, 1975 and 1976 respectively). Ottawa: Revenue Canada.

Column 5: Revenue Canada Tax Guide, 1974, 1975 and 1976 editions. Ottawa; Revenue Canada.

APPENDIX I

METHODOLOGY USED TO ESTIMATE PHYSICAL PLANT RELATED COSTS AT THE DENTAL DIVISION, WASCANA INSTITUTE

METHODOLOGY FOR ESTIMATING PHYSICAL PLANT RELATED COSTS AT THE DENTAL DIVISION, WASCANA INSTITUTE

The dental division of Wascana Institute is housed in a facility separate from the other parts of the Institute. Moreover, the division is situated within the Regina General Hospital Complex. This hospital was acquired by the Province of Saskatchewan in 1974 as a result of a negotiation process that had been underway since the early 1970's.

Construction cost data were not available for that part of the Regina General Hospital Complex occupied by the dental division. Furthermore, the maintenance cost data available were incomplete as the hospital continued to provide some services. Finally, property tax exemption data were not available for a part of the hospital complex.

These data constraints posed difficulties in the calculation of physical plant costs and in the calculation of the imputed costs pertaining to interest on physical plant and property tax exemptions. The methodology used for the other facilities in this study simply could not be employed here. Consequently, an alternative methodology was used as described below.

Physical Plant Costs

Annual use Charge. The annual use charge for the dental division was calculated on the value of the renovations only. It is noteworthy that parts of the building in question were at least 45 years old and extensive renovations were required to make it a suitable facility for housing the dental division. The actual costs of renovations and the derived annual use charge are shown in Table 59.

Maintenance Costs. These costs were estimated by using the prevailing maintenance and operations rate for rental facilities as shown in Table 60. The square footage figures were provided by the Department of Government Services. The maintenance costs for the division, then, can be summarized as follows:

Year	Square Feet	Rate/Sq. Ft.	Estimated Costs
1974	20,888	$2.04	$42,612
1975	38,457	$2.25	$86,528
1976	39,366	$2.44	$96,053

Imputed Costs

Interest. The accumulated value of renovations (as shown in Table 59) was used to estimate interest on the physical plant. These costs for the division can be summarized as follows:

Year	Accumulated Value of Renovations	Interest Rate (%)	Imputed Interest
1974	892,687	10	$ 89,269
1975	1,730,936	10	$173,094
1976	1,747,554	10	$174,755

Property Tax Exemptions. The component of the maintenance and operations rate for property taxes (as shown in Table 60) was used to estimate the value of the property tax exemption. The costs for the division can be summarized as follows:

Year	Square Feet	Rate/Sq. Ft.	Estimated Costs
1974	20,888	$0.80	$16,710
1975	38,457	$0.91	$34,996
1976	39,366	$0.91	$35,823

Summary

Once the division costs were estimated, costs were allocated to the dental nursing and dental assistant programs using the student training day allocation approach. However, in 1974 only the dental nursing program was in operation so all costs were attributed to that program.

Table 59

Costs of Renovations and Annual Use Charge for Dental Division, Wascana Institute

Year	Expenditures on Renovations	Accumulated Value of Renovations	Annual Use Charge[a]
1972	$ 46,697		
1973	$395,782		
1974	$450,208	$ 892,687	$17,854
1975	$838,249	$1,730,936	$34,618
1976	$ 16,618	$1,747,554	$34,951

Source. Expenditure data obtained from the Saskatchewan Department of Government Services.

[a] Represents 1/50 of the accumulated value of renovations.

Table 60

Annual Maintenance and Operations Rate
(Dollars Per Square Foot)

Year	Rate Excluding Tax Component	Property Tax Component	Total Rate
1974	2.04	.80[a]	$2.84
1975	2.25	.91	$3.16
1976	2.44	.91	$3.35

Source. Saskatchewan Department of Government Services. Government-Crown Corporation Joint Use Policy and Rental Schedule. Regina. 1978.

[a] The breakdown of the 1974 rate was not available. The same proportion of the total rate was used for taxes as in the succeeding two years.

APPENDIX J

SUPPLEMENTARY COST DATA

Table 61

Annual Use Charges[a] for Program Specific Equipment
Included in Direct Instructional Costs

Institute Program or Program Area	Year 1974	 1975	 1976
Kelsey Institute			
Diploma Nursing	$1,696	$1,659	$1,217
Nursing Assistant	59	77	157
Combined Technician	4,448	5,084	5,722
Dental Assistant	3,890	4,087	4,664
Medical Lab. Technology	858	1,635	2,090
Wascana Institute			
Health Sciences Division[b]	1,866	2,751	3,041
Dental Division[b]	44,590	46,243	47,781

Source. Institutes' accounting depreciation schedules.

[a] The annual use charge was derived assuming a ten year life for equipment or at the rate of 10 per cent per annum.

[b] Division total was allocated to specific programs on the basis of student training days.

Table 62

Annual Use Charges[a] for Overhead Equipment Included in Indirect Instructional Cost

Institute	Year 1974	 1975	 1976
Kelsey Institute			
All Costs Centers[b]	$48,177	$47,719	$49,523
Wascana Institute			
Administration[c]	4,535	4,535	4,535
Budgets & Accounting[c]	221	221	221
Office & Support[c]	180	257	496
Duplicating	1,793	1,968	1,968
Supply & Transportation[c]	292	292	331
Audio Visual[c]	4,326	9,618	10,838
Resource Centre	1,295	1,600	1,755
Student Affairs	410	950	1,087

Source. Institutes' accounting depreciation schedules.

[a] The annual use charge was derived assuming a ten year life for equipment or at the rate of 10 per cent per annum.

[b] Allocated to specific programs on the basis of student training days following the practice at the Institute.

[c] Allocated following the practice at Institute whereby the proportional distribution of costs for duplicating, resource centre and student affairs were 45, 65 and 55 per cent for the health sciences division. The corresponding proportions for the dental division were 15, 20 and 35 per cent. The distribution to specific programs within the divisions was made on the basis of student training days.

Table 63

Distribution of Health Sciences Student Training Days as Percentage of Total Health Sciences Student Training Days and Total Institute Student Training Days

Kelsey Institute

	Year								
	1974			1975			1976		
Program	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute
Diploma Nursing	114,766	56.04	22.3	108,710	56.28	21.7	107,840	57.93	22.7
Nursing Assistant	51,000	24.90	9.9	41,537	21.51	8.3	40,450	21.73	8.5
Combined Technician	4,938	2.41	1.0	8,570	4.44	1.7	8,716	4.68	1.8
Dental Assistant	16,000	7.81	3.1	15,200	7.87	3.0	12,960	6.96	2.7
Medical Lab. Technology	18,098	8.84	3.5	19,130	9.90	3.8	16,200	8.70	3.4
Total Health Sciences	204,802	100.00	39.8	193,147	100.00	38.5	186,166	100.00	39.3
Total Institute	514,058		100.0	501,123		100.0	474,234		100.0

Source. Kelsey Institute accounting records.

Table 64

Distribution of Health Sciences Student Training Days as Percentage of Total Health Sciences Student Training Days and Total Institute Student Training Days

Wascana Institute

	Year								
	1974			1975			1976		
Program	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute
Core Year									
Diploma Nursing, Year One	37,682	26.58	14.0	38,564	28.16	14.6	33,886	27.93	15.4
Nursing Assistant	22,014	15.53	8.2	21,236	15.50	8.0	18,332	15.11	8.3
Psychiatric Nursing, Year One	26,501	18.69	9.9	24,486	17.88	9.2	18,154	14.97	8.3
Health Record Technology, Year One	3,059	2.16	1.1	3,257	2.39	1.2	3,394	2.80	1.5
Diploma Nursing, Year Two	34,348	24.23	12.8	35,348	25.81	13.3	32,736	26.98	14.9
Psychiatric Nursing, Year Two	14,912	10.52	5.6	10,091	7.37	3.8	10,850	8.94	4.9
Health Record Technology, Year Two	1,573	1.11	0.6	1,850	1.35	0.7	2,018	1.66	0.9
Operating Room Nursing & Techniques	1,688	1.19	0.6	2,151	1.57	0.8	1,959	1.62	0.9
Total Health Sciences	141,777	100.00	52.7	136,983	100.00	51.7	121,329	100.00	55.2
Total Institute	268,896		100.0	265,130		100.0	219,967		100.0

Source. Wascana Institute Accounting and Registrar's records.

Table 65

Distribution of Dental Division Student Training Days as Percentage of Total Dental Division Student Training Days and Total Institute Student Training Days

Wascana Institute, Dental Division

Program	Year								
	1974			1975			1976		
	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute	Number of Student Training Days	% of Total Health Sciences	% of Total Institute
Dental Nursing	24,554	100.00	9.1	30,379	76.61	11.5	33,819	72.92	15.4
Dental Assistant	a	a	a	9,272	23.39	3.5	12,560	27.08	5.7
Total Dental Division	24,544	100.00		39,651	100.00		46,379	100.00	
Total Institute	268,896		100.0	265,130		100.0	219,967		100.0

Source. Wascana Institute Accounting and Registrar's records.

[a] Program not in operation.

Table 66

Construction Costs and Derived Annual Use Charges for Kelsey Institute and Wascana Institute, Parkway Campus[a]

	Year		
	1974	1975	1976
Accumulated Costs			
Kelsey Institute	$8,413,625[b]	$8,413,625[b]	$8,413,625[b]
Wascana Institute, Parkway Campus	2,745,850	2,745,850	2,745,850
Derived Annual Use Charge (1/50)			
Kelsey Institute	168,273	168,273	168,273
Wascana Institute, Parkway Campus	54,917	54,917	54,917

Source. Saskatchewan Department of Government Services.

[a] The Parkway Campus houses the health sciences division.

[b] Excludes expenditure on swimming pool.

Table 67

Total Physical Plant Costs for Kelsey Institute and Wascana Institute, Parkway Campus

Cost Component	Year					
	1974		1975		1976	
	Kelsey	Wascana	Kelsey	Wascana	Kelsey	Wascana
Maintenance Costs	$773,435	$45,393	$964,189	$138,262	$1,013,762	$138,113
Annual Use Charge	168,273	54,917	168,273	54,917	168,273	54,917
Total Physical Plant Costs	941,708	100,310	1,132,462	$193,179	$1,182,035	$193,030

Source. Department of Government Services. (Derivation of annual use charge is shown in Table 66).

Table 68

Space Occupied by Health Sciences Programs as a Proportion of Total Institute Space

	Kelsey Institute			Wascana Institute Parkway Campus		
	1974	1975	1976	1974	1975	1976
Total Useable Square Feet in Institute	388,574	388,574	388,574	45,560	45,560	45,560
Square Feet Occupied by Health Sciences	54,573	54,573	54,573	24,788	24,788	24,788
Administration Square Feet Prorated for Health Sciences[a]	35,839	34,668	35,388	10,947	10,739	11,466
Total Square Feet Attributable to Health Sciences	90,412	89,241	89,961	35,735	35,527	36,524
Health Sciences as Proportion of Total Institute Space	.233	.230	.232	.784	.780	.802

Source. Department of Government Services.

[a] Prorated on basis of student training days.

Table 69

Proration of Relevant Central Department of Continuing Costs to Institutes

Cost Component	Year		
	1974	1975	1976[a]
1. Total Department Expenditure	$76,564,662	$96,452,954	$115,949,594
2. Total Non-University Expenditure	$25,285,442	$33,792,954	$ 36,099,594
3. Total Kelsey Institute Expenditures	$ 5,779,870	$ 7,096,598	$ 7,268,905
- As % of Total Department Expenditure	7.54%	7.36%	6.27%
- As % of Total Non-University Expenditure	22.86%	21.00%	20.14%
4. Total Wascana Institute Expenditure	$ 3,537,548	$ 4,031,350	$ 4,184,041
- As % of Total Department Expenditure	4.62%	4.18%	3.60%
- As % of Total Non-University Expenditure	13.99%	11.93%	11.59%
5. Central Department Costs Relevant to Entire Post-Secondary System[b]			
- Executive Administration (Deputy Minister's Office)	$ 47,302	$ 49,864	$ 60,000
- Administrative Services	$ 77,642	$ 96,122	$ 262,670
- Student Services[d]	$ 94,382	$ 121,485	$ 184,870
- Research & Planning[e]	$ 266,738	$ 636,076	$ 503,742
6. Central Department Costs Relevant Only to Non-University Sector[c]			
- Colleges Branch	$ 414,652	$ 636,076	[a]
- Manpower Programs	[a]	[a]	$ 384,956
- Program Development	[a]	[a]	$ 78,271
- Executive Administration (Other Than Deputy Minister's Office)	[a]	[a]	$ 100,478

Source. Expenditures obtained from Province of Saskatchewan, Public Accounts. The identification of relevant costs to be included for proration was done in consultation with Department of Continuing Education officials.

[a] The Department of Continuing Education was reorganized in 1976-77. This involved the enlargement of executive administration, the creation of the manpower programs and program development sections and the deletion of the Colleges Branch as it previously existed.

[b] These costs were prorated to each Institute by using the Institute's share of total Department of Continuing Education expenditure as noted in items #3 and #4 in above table.

[c] These costs were prorated to each Institute by using the Institute's share of total non-university expenditure as noted in items #3 and #4 in above table.

[d] Called Student Aid administration in 1974 and 1975.

[e] Called Research and Evaluation in 1974 and 1975.

Table 70

Price Index for Recreation, Education and Reading

	1974	1975		1976	
City	Value	Value	% Increase Over 1974	Value	% Increase Over 1975
Regina	122.1	136.2	(11.5)	148.3	(21.4)
Saskatoon	121.3	135.9	(12.0)	145.5	(20.0)

Source. Statistics Canada, Consumer Prices and Price Indexes (Catalogue No. 62-010).

APPENDIX K

PER STUDENT AND PER GRADUATE EDUCATIONAL INSTITUTION COSTS

Table 71

Educational Institution Costs Per Student by Program

Two Year Programs

Program Year	Direct Instructional $	Direct Instructional %	Indirect Instructional $	Indirect Instructional %	Physical Plant $	Physical Plant %	Central Department $	Central Department %	Total $	Total %	Percentage Change in Per Student Cost over Previous Year
Diploma Nursing Kelsey											
1974	2,700	57.9	1,393	29.9	462	9.9	110	2.4	4,665	100.0	
1975	3,614	59.2	1,760	28.9	577	9.5	155	2.6	6,106	100.0	+30.9
1976	4,156	57.7	2,198	30.5	683	9.5	173	2.4	7,210	100.0	+18.1
Diploma Nursing Wascana											
1974	3,557	70.5	1,113	22.1	246	4.9	133	2.7	5,048	100.0	
1975	4,421	67.4	1,469	22.4	497	7.6	175	2.7	6,563	100.0	+30.0
1976	5,718	68.0	1,922	22.9	569	6.8	206	2.5	8,416	100.0	+28.2
Psychiatric Nursing											
1974	4,346	72.8	1,216	20.4	268	4.5	145	2.5	5,975	100.0	
1975	6,053	72.8	1,555	18.7	526	6.4	186	2.3	8,321	100.0	+39.3
1976	7,263	72.9	1,925	19.4	569	5.8	206	2.1	9,963	100.0	+19.7
Dental Nursing											
1974	11,475	78.6	1,958	13.4	1,043	7.2	126	0.9	14,602	100.0	
1975	9,799	75.0	1,824	14.0	1,289	9.9	164	1.3	13,076	100.0	-10.5
1976	9,426	73.8	2,000	15.7	1,165	9.2	191	1.5	12,782	100.0	-2.2
Health Record Administrator											
1974	4,662	69.9	971	14.6	216	3.3	114	1.7	6,675[a]	100.0	
1975	6,305	69.6	1,539	17.0	521	5.8	178	2.0	9,070[a]	100.0	+35.9
1976	5,384	62.4	1,655	19.2	490	5.7	173	2.0	8,640[a]	100.0	-4.7

[a] Includes costs of courses provided by the University of Regina which amounted to $712 (10.7%), $528 (5.9%), and $938 (10.9%) for 1974, 1975 and 1976, respectively.

Table 72

Educational Institution Costs Per Graduate by Program

Two Year Programs

Program Year	Direct Instructional $	Direct Instructional %	Indirect Instructional $	Indirect Instructional %	Physical Plant $	Physical Plant %	Central Department $	Central Department %	Total $	Total %	Percentage Change in Per Graduate Cost over Previous Year
Diploma Nursing Kelsey											
1974	3,171	57.9	1,636	29.9	543	10.0	129	2.4	5,479	100.0	
1975	4,220	59.2	2,056	28.9	674	9.5	181	2.6	7,131	100.0	+30.2
1976	4,994	57.7	2,640	30.5	821	9.5	208	2.4	8,663	100.0	+21.5
Diploma Nursing Wascana											
1974	4,533	70.5	1,419	22.1	313	4.9	169	2.7	6,434	100.0	
1975	5,647	67.4	1,877	22.4	635	7.6	224	2.7	8,383	100.0	+30.3
1976	6,653	68.0	2,236	22.9	661	6.8	240	2.5	9,791	100.0	+16.8
Psychiatric Nursing											
1974	7,822	72.8	2,188	20.4	483	4.5	262	2.5	10,755	100.0	
1975	9,794	72.8	2,516	18.7	851	6.4	301	2.3	13,462	100.0	+25.2
1976	9,939	72.9	2,634	19.4	779	5.8	282	2.1	13,634	100.0	+1.3
Dental Nursing											
1974	12,439	78.6	2,123	13.5	1,130	7.2	137	0.9	15,829	100.0	
1975	10,854	75.0	2,021	14.0	1,428	9.9	182	1.3	14,485	100.0	-8.5
1976	10,811	73.8	2,293	15.7	1,336	9.2	219	1.5	14,659	100.0	+1.2
Health Record Administrator											
1974	6,582	69.9	1,370	14.6	305	3.3	161	1.7	9,424[a]	100.0	
1975	8,160	69.6	1,992	17.0	674	5.8	230	2.0	11,738[a]	100.0	+24.6
1976	6,517	62.3	2,004	19.2	593	5.7	210	2.0	10,459[a]	100.0	-10.9

[a] Includes costs of courses provided by the University of Regina which amounted to $1,006 (10.7%), $683 (5.9%), and $1,136 (10.9%) for 1974, 1975 and 1976, respectively.

Table 73

Educational Institution Costs Per Student by Program

One Year or Less Programs

Program Year	Direct Instructional $	Direct Instructional %	Indirect Instructional $	Indirect Instructional %	Physical Plant $	Physical Plant %	Central Department $	Central Department %	Total $	Total %	Percentage Change in Per Student Cost over Previous Year
Nursing Assistant Kelsey											
1974	1,392	57.3	738	30.4	245	10.1	58	2.4	2,433	100.0	
1975	2,103	60.4	978	28.1	321	9.2	86	2.5	3,486	100.0	+43.3
1976	1,922	58.7	973	29.7	302	9.3	77	2.4	3,275	100.0	-6.1
Nursing Assistant Wascana											
1974	1,698	69.3	563	23.0	124	5.1	67	2.8	2,453	100.0	
1975	2,176	66.6	750	23.0	254	7.8	90	2.8	3,270	100.0	+33.3
1976	2,898	68.2	966	22.7	286	6.8	104	2.5	4,254	100.0	+30.1
Dental Assistant Kelsey											
1974	1,520	62.6	644	26.6	214	8.9	51	2.1	2,429	100.0	
1975	1,716	61.3	763	27.3	253	9.1	67	2.4	2,799	100.0	+15.2
1976	2,053	60.7	958	28.3	298	8.8	75	2.3	3,384	100.0	+20.9
Dental Assistant Wascana											
1975	1,409	54.4	657	25.4	465	18.0	59	2.3	2,590	100.0	
1976	3,387	65.8	1,050	20.4	612	11.9	100	2.0	5,149	100.0	+98.8
Medical Lab. Technology											
1974	2,096	68.5	684	22.4	228	7.5	54	1.8	3,063	100.0	
1975	2,283	67.1	791	23.3	260	7.7	70	2.1	3,404	100.0	+11.1
1976	3,618	69.2	1,164	22.3	361	6.9	91	1.8	5,235	100.0	+53.8
Combined Technician											
1974	2,485	72.8	665	19.5	212	6.2	53	1.6	3,414	100.0	
1975	2,305	67.7	778	22.9	257	7.6	69	2.1	3,408	100.0	-0.2
1976	2,469	65.6	940	25.0	292	7.8	69	1.9	3,768	100.0	+10.6
Operating Room Nursing											
1974	3,575	89.9	303	7.7	67	1.7	34	0.9	3,979	100.0	
1975	3,130	85.6	365	10.0	121	3.3	41	1.2	3,657	100.0	-8.1
1976	3,955	85.5	482	10.5	139	3.0	51	1.1	4,627	100.0	+26.5

Table 74

Educational Institution Costs Per Graduate by Program

One Year or Less Programs

Program Year	Direct Instructional $	Direct Instructional %	Indirect Instructional $	Indirect Instructional %	Physical Plant $	Physical Plant %	Central Department $	Central Department %	Total $	Total %	Percentage Change in Per Graduate Cost over Previous Year
Nursing Assistant Kelsey											
1974	1,678	57.3	889	30.4	295	10.1	70	2.4	2,933	100.0	
1975	2,258	60.4	1,050	28.1	344	9.2	93	2.5	3,743	100.0	+27.6
1976	2,176	58.7	1,101	29.7	342	9.3	87	2.4	3,708	100.0	-0.9
Nursing Assistant Wascana											
1974	2,106	69.2	699	23.0	154	5.1	83	2.8	3,043	100.0	
1975	2,567	66.6	885	23.0	299	7.8	106	2.8	3,857	100.0	+26.7
1976	3,255	68.2	1,085	22.7	321	6.8	116	2.5	4,778	100.0	+23.9
Dental Assistant Kelsey											
1974	1,900	62.6	805	26.6	268	8.9	64	2.1	3,036	100.0	
1975	2,316	61.3	1,030	27.3	342	9.1	91	2.4	3,779	100.0	+24.5
1976	2,576	60.7	1,203	28.4	374	8.8	94	2.3	4,246	100.0	+12.4
Dental Assistant Wascana											
1975	1,432	54.4	668	25.4	472	18.0	60	2.3	2,633	100.0	
1976	3,852	65.8	1,194	20.4	696	11.9	114	2.0	5,856	100.0	+122.4
Medical Lab. Technology											
1974	2,970	68.5	969	22.4	323	7.5	77	1.8	4,339	100.0	
1975	2,897	67.1	1,004	23.3	331	7.7	88	2.1	4,320	100.0	-0.4
1976	4,342	69.2	1,397	22.3	434	6.9	109	1.8	6,282	100.0	+45.4
Combined Technician											
1974	3,654	72.8	977	19.5	311	6.2	77	1.6	5,020	100.0	
1975	2,963	67.7	1,001	22.9	330	7.6	88	2.0	4,382	100.0	-12.7
1976	2,936	65.6	1,117	25.0	347	7.8	81	1.8	4,481	100.0	+2.3
Operating Room Nursing											
1974	4,171	89.9	353	7.6	79	1.7	40	0.9	4,643	100.0	
1975	3,130	85.6	365	10.0	121	3.3	41	1.2	3,657	100.0	-21.1
1976	5,085	85.5	619	10.4	179	3.0	65	1.1	5,949	100.0	+62.7

APPENDIX L

SOCIAL COSTS OF NURSING ASSISTANT AND DENTAL ASSISTANT PROGRAMS USING A GRADE 11 REFERENCE GROUP

Table 75

Social Costs of the Nursing Assistant and Dental Assistant Programs
Using a Grade 11 Reference Group

Year Component	Nursing Assistant Kelsey		Nursing Assistant Wascana		Dental Assistant Kelsey		Dental Assistant Wascana	
	$	%	$	%	$	%	$	%
1974								
1. Net Ed. Institution Costs	495,943	33.5	219,911	32.3	177,604	33.9	[a]	
2. Net Foregone Earnings	677,697	45.7	297,822	43.8	243,120	46.4		
3. Student Educational Costs	88,754	6.0	39,004	5.8	31,840	6.1		
4. Gov't Subsidies to Students	155,223	10.5	85,444	12.6	51,303	9.8		
5. Imputed Costs	65,794	4.5	38,748	5.7	20,636	4.0		
Total	1,483,411	100.0	680,929	100.0	524,503	100.0		
1975								
1. Net Ed. Institution Costs	573,405	40.7	281,632	36.4	209,782	34.6	145,238	31.1
2. Net Foregone Earnings	622,475	44.2	327,244	42.3	288,117	47.5	216,977	46.4
3. Student Educational Costs	72,975	5.2	38,364	5.0	33,777	5.6	25,437	5.5
4. Gov't Subsidies to Students	81,783	5.8	88,506	11.5	54,415	9.0	31,487	6.8
5. Imputed Costs	58,567	4.2	39,438	3.6	21,428	3.6	48,673	10.4
Total	1,409,205	100.0	775,184	100.0	607,519	100.0	467,812	100.0
1976								
1. Net Ed. Institution Costs	603,942	34.6	331,650	40.8	203,190	36.4	286,526	44.3
2. Net Foregone Earnings	789,773	45.2	328,738	40.5	256,576	45.9	232,522	35.9
3. Student Educational Costs	85,301	4.9	35,506	4.4	27,712	5.0	25,114	3.9
4. Gov't Subsidies to Students	207,849	11.9	77,325	9.6	52,208	9.4	46,473	7.2
5. Imputed Costs	60,455	3.5	39,563	4.9	19,364	3.5	57,025	8.8
Total	1,747,320	100.0	812,782	100.0	559,050	100.0	647,660	100.0

Note. The percentage breakdowns may not total exactly 100 per cent because of rounding error.

[a] This program was not in operation in 1974.

Table 76

Per Student Social Costs and Per Graduate Social Costs for the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group

Year Component	Nursing Assistant Kelsey		Nursing Assistant Wascana		Dental Assistant Kelsey		Dental Assistant Wascana	
	Per Student $	Per Graduate $	Per Student $	Per Graduate $	Per Student $	Per Graduate $	Per Student $	Per Graduate $
1974								
1. Net Ed. Institution Costs	2,224	2,681	2,244	2,784	2,220	2,775		
2. Net Foregone Earnings	3,039	3,663	3,039	3,770	3,039	3,799		
3. Student Educational Costs	398	480	398	494	398	497	[a]	
4. Gov't Subsidies to Students	696	839	872	1,082	641	802		
5. Imputed Costs	295	356	395	490	258	322		
Total	6,652	8,018	6,948	8,619	6,556	8,195		
1975								
1. Net Ed. Institution Costs	3,277	3,819	3,061	3,611	2,590	3,496	2,381	2,421
2. Net Foregone Earnings	3,557	3,819	3,557	4,195	3,557	4,802	3,557	3,616
3. Student Educational Costs	417	448	417	492	417	563	417	424
4. Gov't Subsidies to Students	468	502	962	1,135	672	907	516	525
5. Imputed Costs	335	360	429	506	265	357	798	811
Total	8,053	8,645	8,426	9,938	7,500	10,125	7,669	7,797
1976								
1. Net Ed. Institution Costs	3,066	3,471	4,045	4,543	3,175	3,984	4,940	5,618
2. Net Foregone Earnings	4,009	4,539	4,009	4,503	4,009	5,031	4,009	4,559
3. Student Educational Costs	433	490	433	486	433	543	433	492
4. Gov't Subsidies to Students	1,055	1,195	943	1,059	815	1,023	801	911
5. Imputed Costs	307	347	482	542	302	380	983	1,118
Total	8,870	10,042	9,912	11,134	8,735	10,962	11,167	12,699

[a] This program was not in operation in 1974.

APPENDIX M

ESTIMATED LIFETIME SOCIAL EARNINGS DIFFERENTIALS

Table 77

Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile A with Alternative Cost Bases and Alpha Coefficients

Program Alpha Coefficient	Year and Cost Basis					
	1974		1975		1976	
	Per Student	Per Graduate	Per Student	Per Graduate	Per Student	Per Graduate
Diploma Nursing Kelsey						
Alpha = 100%	$61,414	$59,785	$48,879	$46,942	$94,886	$92,203
Alpha = 77%	44,195	42,566	33,877	31,940	68,756	66,073
Diploma Nursing Wascana						
Alpha = 100%	60,805	58,075	48,188	44,797	93,408	90,991
Alpha = 77%	43,586	40,856	33,186	29,795	67,278	64,861
Psychiatric Nursing						
Alpha = 100%	94,230	85,474	92,029	83,351	134,268	128,244
Alpha = 77%	69,093	60,337	66,529	57,851	98,378	92,354
Dental Nursing						
Alpha = 100%	96,203	94,477	95,740	93,574	134,858	131,912
Alpha = 77%	68,404	66,678	67,987	65,821	97,980	95,034
Health Record Administrator						
Alpha = 100%	-3,952	-8,679	-22,899	-27,243	38,352	35,220
Alpha = 77%	-6,938	-11,665	-24,222	-28,566	24,865	21,733
Nursing Assistant Kelsey						
Alpha = 100%	-37,356	-38,883	-53,788	-54,448	2,114	805
Alpha = 77%	-37,866	-39,393	-54,287	-54,947	-1,460	-2,769
Nursing Assistant Wascana						
Alpha = 100%	-37,652	-39,511	-54,161	-55,838	1,072	-277
Alpha = 77%	-38,162	-40,021	-54,660	-56,337	-2,502	-3,851
Dental Assistant Kelsey						
Alpha = 100%	-38,726	-40,561	-53,360	-56,306	-26,882	-29,372
Alpha = 77%	-39,105	-40,940	-53,727	-56,673	-28,404	-30,894
Dental Assistant Wascana						
Alpha = 100%	Not Offered		-53,528	-53,671	-29,313	-30,987
Alpha = 77%	Not Offered		-53,895	-54,038	-30,835	-32,509
Medical Lab. Technology						
Alpha = 100%	70,273	67,052	48,306	45,921	94,658	92,357
Alpha = 77%	51,690	48,469	34,284	31,899	70,240	67,939
Combined Technician						
Alpha = 100%	-34,895	-38,720	-50,817	-53,453	8,435	6,491
Alpha = 77%	-36,131	-39,956	-52,057	-54,693	3,322	1,379
Operating Room Nursing						
Alpha = 100%	-3,982	-5,284	-4,134	-4,134	-6,221	-9,027
Alpha = 77%	-5,003	-6,305	-5,155	-5,155	-7,242	-10,048

Note. The differentials were calculated using a zero discount rate and the grade 12 reference group in all cases except operating room nursing where the registered nurse reference group was used.

Table 78

Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile B with Alternative Cost Bases and Alpha Coefficients

	Year and Cost Basis					
	1974		1975		1976	
Program Alpha Coefficient	Per Student	Per Graduate	Per Student	Per Graduate	Per Student	Per Graduate
Diploma Nursing Kelsey						
Alpha = 100%	$53,999	$52,370	$41,653	$39,716	$84,098	$81,415
Alpha = 77%	38,485	36,856	28,313	26,376	60,450	57,767
Diploma Nursing Wascana						
Alpha = 100%	53,390	50,660	40,962	37,571	82,620	80,203
Alpha = 77%	37,876	35,146	27,622	24,231	58,972	56,555
Psychiatric Nursing						
Alpha = 100%	84,523	75,767	81,775	73,197	120,658	114,634
Alpha = 77%	61,619	52,863	58,633	49,955	87,898	81,874
Dental Nursing						
Alpha = 100%	85,807	84,081	84,915	82,749	121,034	118,088
Alpha = 77%	60,400	58,674	59,651	57,485	87,336	84,390
Health Record Administrator						
Alpha = 100%	-7,230	-11,957	-25,635	-29,979	31,170	28,038
Alpha = 77%	-9,736	14,463	-26,553	-30,897	19,334	16,202
Nursing Assistant Kelsey						
Alpha = 100%	-37,941	-39,468	-53,840	-54,500	-2,045	-3,354
Alpha = 77%	-38,413	-39,940	-54,300	-54,960	-5,031	-6,340
Nursing Assistant Wascana						
Alpha = 100%	-38,237	-40,096	-54,213	-55,890	-3,087	-4,436
Alpha = 77%	-38,709	-40,568	-54,673	-56,350	-6,073	-7,422
Dental Assistant Kelsey						
Alpha = 100%	-39,243	-41,078	-53,438	-56,384	-29,191	-31,681
Alpha = 77%	-39,589	-41,424	-53,771	-56,717	-30,466	-32,956
Dental Assistant Wascana						
Alpha = 100%	Not Offered		-53,606	-53,749	-31,622	-33,296
Alpha = 77%	Not Offered		-53,939	-54,082	-32,897	-34,571
Medical Lab. Technology						
Alpha = 100%	62,632	59,411	41,581	39,196	84,325	82,024
Alpha = 77%	45,845	42,624	29,158	26,773	62,282	59,981
Combined Technician						
Alpha = 100%	-35,708	-39,533	-51,105	-53,741	3,812	1,868
Alpha = 77%	-36,853	-40,678	-52,252	-54,888	-606	-2,550
Operating Room Nursing						
Alpha = 100%	-4,243	-5,545	-4,386	-4,386	-6,470	-9,276
Alpha = 77%	-5,197	-6,499	-5,342	-5,342	-7,424	-10,230

Note. The differentials were calculated using a zero discount rate and the grade 12 reference group in all cases except operating room nursing where the registered nurse reference group was used.

Table 79

Estimated Lifetime Social Earnings Differentials for Health Personnel Using Earnings Profile C with Alternative Cost Bases and Alpha Coefficients

Program Alpha Coefficient	Year and Cost Basis					
	1974		1975		1976	
	Per Student	Per Graduate	Per Student	Per Graduate	Per Student	Per Graduate
Diploma Nursing Kelsey						
Alpha = 100%	$46,044	$44,415	$41,856	$39,919	$67,746	$65,063
Alpha = 77%	32,360	30,731	28,469	26,532	47,859	45,176
Diploma Nursing Wascana						
Alpha = 100%	45,435	42,705	41,165	37,774	66,268	63,851
Alpha = 77%	31,751	29,021	27,778	24,387	46,381	43,964
Psychiatric Nursing						
Alpha = 100%	61,121	52,365	61,688	53,010	85,246	79,222
Alpha = 77%	43,599	34,843	43,166	34,488	60,631	54,607
Dental Nursing						
Alpha = 100%	58,314	56,588	61,580	59,414	84,868	81,922
Alpha = 77%	39,230	37,504	41,683	39,517	59,489	56,543
Health Record Administrator						
Alpha = 100%	10,585	5,858	2,470	-1,874	36,560	33,428
Alpha = 77%	4,564	-163	-2,603	-6,947	23,485	20,353
Nursing Assistant Kelsey						
Alpha = 100%	-1,886	-3,413	-7,460	-8,120	24,045	22,736
Alpha = 77%	-3,894	-5,421	-9,083	-9,743	16,237	14,928
Nursing Assistant Wascana						
Alpha = 100%	-2,182	-4,041	-7,833	-9,510	23,003	21,654
Alpha = 77%	-4,190	-6,049	-9,456	-11,133	15,195	13,846
Dental Assistant Kelsey						
Alpha = 100%	-1,948	-3,783	-6,298	-9,244	10,296	7,806
Alpha = 77%	-3,944	-5,779	-8,041	-10,987	5,436	2,946
Dental Assistant Wascana						
Alpha = 100%	Not Offered		-6,466	-6,609	7,865	6,191
Alpha = 77%	Not Offered		-8,209	-8,352	3,005	1,331
Medical Lab. Technology						
Alpha = 100%	53,355	50,134	45,188	42,803	71,571	69,270
Alpha = 77%	38,980	35,759	32,301	29,916	52,463	50,162
Combined Technician						
Alpha = 100%	7	-3,818	-4,977	-7,613	28,664	26,720
Alpha = 77%	-2,596	-6,421	-7,230	-9,866	19,708	17,764
Operating Room Nursing						
Alpha = 100%	-5,854	-7,156	-5,995	-5,995	-7,966	-10,772
Alpha = 77%	-6,371	-7,673	-6,513	-6,513	-8,485	-11,291

Note. The differentials were calculated using a zero discount rate and the grade 12 reference group in all cases except operating room nursing where the registered nurse reference group was used.

Table 80

Estimated Lifetime Social Earnings Differentials for Nursing Assistants and Dental Assistants Using a Grade 11 Reference Group with Alternative Earning Profiles, Cost Bases and Alpha Coefficients

	Year and Cost Basis					
	1974		1975		1976	
Program Alpha Coefficient	Per Student	Per Graduate	Per Student	Per Graduate	Per Student	Per Graduate
Earnings Profile A						
Nursing Assistant Kelsey						
Alpha = 100%	$58,360	$56,994	$58,260	$57,668	$129,995	$128,823
Alpha = 77%	43,407	42,041	43,008	42,416	98,056	96,884
Nursing Assistant Wascana						
Alpha = 100%	58,064	56,393	57,887	56,375	128,953	127,731
Alpha = 77%	43,111	41,440	42,635	41,123	97,014	95,792
Dental Assistant Kelsey						
Alpha = 100%	59,244	57,605	61,329	58,704	104,012	101,785
Alpha = 77%	44,110	42,471	45,498	42,873	78,080	75,853
Dental Assistant Wascana						
Alpha = 100%	Not Offered		61,160	61,032	101,580	100,048
Alpha = 77%	Not Offered		45,329	45,201	75,648	74,116
Earnings Profile B						
Nursing Assistant Kelsey						
Alpha = 100%	52,478	51,112	52,010	51,418	118,769	117,597
Alpha = 77%	38,878	37,512	38,195	37,603	89,412	88,240
Nursing Assistant Wascana						
Alpha = 100%	52,182	50,511	51,637	50,125	117,727	116,505
Alpha = 77%	38,582	36,911	37,822	36,310	88,370	87,148
Dental Assistant Kelsey						
Alpha = 100%	53,318	51,679	54,921	52,296	94,486	92,259
Alpha = 77%	39,547	37,908	40,564	37,939	70,745	68,518
Dental Assistant Wascana						
Alpha = 100%	Not Offered		54,752	54,624	92,054	90,522
Alpha = 77%	Not Offered		40,395	40,267	68,313	66,781
Earnings Profile C						
Nursing Assistant Kelsey						
Alpha = 100%	43,582	42,216	45,771	45,179	84,785	83,613
Alpha = 77%	32,028	30,662	33,391	32,799	63,244	62,072
Nursing Assistant Wascana						
Alpha = 100%	43,286	41,615	45,398	43,886	83,743	82,521
Alpha = 77%	31,732	30,061	33,018	31,506	62,202	60,980
Dental Assistant Kelsey						
Alpha = 100%	46,508	44,869	50,432	47,807	75,029	72,802
Alpha = 77%	34,303	32,664	37,108	34,483	55,763	53,536
Dental Assistant Wascana						
Alpha = 100%	Not Offered		50,263	50,135	72,597	71,605
Alpha = 77%	Not Offered		36,939	36,811	53,331	51,799

Note. These differentials were calculated using a zero discount rate.

APPENDIX N

ESTIMATED LIFETIME PRIVATE EARNINGS DIFFERENTIALS

R

Table 81

Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile A
by Alpha Coefficient and Type of Student

Program Alpha Coefficient	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Two Year Programs									
Diploma Nursing									
Alpha = 100%	$51,297	$51,981	N/A	$36,716	$37,626	N/A	$77,009	$77,989	N/A
Alpha = 77%	37,624	38,308	N/A	26,044	26,954	N/A	56,846	57,826	N/A
Psychiatric Nursing									
Alpha = 100%	70,450	71,134	N/A	74,494	75,404	N/A	110,034	111,014	N/A
Alpha = 77%	52,372	53,056	N/A	55,133	56,043	N/A	82,275	83,255	N/A
Dental Nursing									
Alpha = 100%	78,831	79,515	N/A	81,252	82,162	N/A	111,374	112,354	N/A
Alpha = 77%	58,825	59,509	N/A	60,337	61,247	N/A	83,307	84,287	N/A
Health Record Administrator									
Alpha = 100%	-823	-139	N/A	-13,388	-12,478	N/A	33,766	34,746	N/A
Alpha = 77%	-2,816	-2,132	N/A	-14,228	-13,318	N/A	23,549	24,529	N/A
One Year or Less Programs									
Nursing Assistant									
Alpha = 100%	-24,738	-24,396	-21,624	-40,323	-39,868	-37,155	1,929	2,419	5,589
Alpha = 77%	-25,129	-24,787	-22,015	-40,701	-40,246	-37,533	-541	-51	3,119
Dental Assistant									
Alpha = 100%	-26,100	-25,758	-22,986	-40,248	-39,793	-37,080	-17,611	-17,121	-13,951
Alpha = 77%	-26,377	-26,035	-23,263	-40,519	-40,064	-37,351	-18,861	-18,371	-15,201
Medical Lab. Technology									
Alpha = 100%	51,942	52,284	55,056	34,313	34,768	37,481	75,645	76,135	79,305
Alpha = 77%	38,527	38,869	41,641	24,563	25,018	27,731	57,029	57,519	60,689
Combined Technician									
Alpha = 100%	-22,228	-21,886	-19,114	-37,917	-37,462	-34,749	6,929	7,419	10,589
Alpha = 77%	-23,197	-22,855	-20,083	-38,848	-38,393	-35,680	3,309	3,799	6,969
Operating Room Nursing									
Alpha = 100%	-1,066	-895	N/A	52	280	N/A	-977	-732	N/A
Alpha = 77%	-1,764	-1,593	N/A	-969	-741	N/A	-1,998	-1,753	N/A

Note. N/A denotes not applicable; students were not eligible for training allowances.

Table 82

Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile B by Alpha Coefficient and Type of Student

Program Alpha Coefficient	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Two Year Programs									
Diploma Nursing									
Alpha = 100%	$45,196	$45,880	N/A	$31,019	$31,929	N/A	$68,300	$69,280	N/A
Alpha = 77%	32,926	33,610	N/A	21,657	22,567	N/A	50,140	51,120	N/A
Psychiatric Nursing									
Alpha = 100%	63,062	63,746	N/A	66,292	67,202	N/A	99,126	100,106	N/A
Alpha = 77%	46,683	47,367	N/A	48,817	49,727	N/A	73,876	74,856	N/A
Dental Nursing									
Alpha = 100%	70,940	71,624	N/A	72,661	73,571	N/A	100,424	101,404	N/A
Alpha = 77%	52,749	53,433	N/A	53,722	54,632	N/A	74,875	75,855	N/A
Health Record Administrator									
Alpha = 100%	-3,522	-2,838	N/A	-15,806	-14,896	N/A	27,896	28,876	N/A
Alpha = 77%	-5,131	-4,447	N/A	-16,396	-15,486	N/A	19,029	20,009	N/A
One Year or Less Programs									
Nursing Assistant									
Alpha = 100%	-25,620	-25,278	-22,506	-40,678	-40,223	-37,510	-1,534	-1,044	2,126
Alpha = 77%	-25,974	-25,632	-22,860	-41,026	-40,571	-37,858	-3,542	-3,052	118
Dental Assistant									
Alpha = 100%	-26,921	-26,579	-23,807	-40,645	-40,190	-37,477	-19,848	-19,358	-16,188
Alpha = 77%	-27,173	-26,831	-24,059	-40,890	-40,435	-37,722	-20,886	-20,396	-17,226
Medical Lab. Technology									
Alpha = 100%	46,050	46,392	49,164	29,069	29,524	32,237	67,339	67,829	70,999
Alpha = 77%	34,023	34,365	37,137	20,571	21,026	23,739	50,632	51,122	54,292
Combined Technician									
Alpha = 100%	-23,294	-22,912	-20,180	-38,452	-37,997	-35,284	3,114	3,604	6,774
Alpha = 77%	-24,183	-23,841	-21,069	-39,312	-38,857	-36,144	37	527	3,697
Operating Room Nursing									
Alpha = 100%	-1,242	-1,071	N/A	-217	11	N/A	-1,237	-992	N/A
Alpha = 77%	-1,892	-1,721	N/A	-1,172	-944	N/A	-2,191	-1,946	N/A

Note. N/A denotes not applicable; students were not eligible for training allowances.

Table 83

Estimated Lifetime Private Earnings Differentials for Health Personnel Using Earnings Profile C by Alpha Coefficient and Type of Student

Program Alpha Coefficient	Year and Type of Student								
	1974			1975			1976		
	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient	Self-Supporting	Bursary Recipient	Allowance Recipient
Two Year Programs									
Diploma Nursing									
Alpha = 100%	$40,562	$41,246	N/A	$35,702	$36,612	N/A	$58,909	$59,889	N/A
Alpha = 77%	29,358	30,042	N/A	25,263	26,173	N/A	42,909	43,889	N/A
Psychiatric Nursing									
Alpha = 100%	49,647	50,331	N/A	54,173	55,083	N/A	74,864	75,844	N/A
Alpha = 77%	36,354	37,038	N/A	39,486	40,396	N/A	55,194	56,174	N/A
Dental Nursing									
Alpha = 100%	54,632	55,316	N/A	58,436	59,346	N/A	76,488	77,468	N/A
Alpha = 77%	40,192	40,876	N/A	42,768	43,678	N/A	56,445	57,425	N/A
Health Record Administrator									
Alpha = 100%	13,096	13,780	N/A	9,130	10,040	N/A	35,514	36,494	N/A
Alpha = 77%	8,209	8,893	N/A	4,803	5,713	N/A	24,895	25,875	N/A
One Year or Less Programs									
Nursing Assistant									
Alpha = 100%	3,363	3,705	6,477	-1,690	-1,235	1,478	22,659	23,149	26,319
Alpha = 77%	1,233	1,575	4,347	-3,376	-2,921	-208	16,230	16,720	19,890
Dental Assistant									
Alpha = 100%	3,201	3,543	6,315	-1,031	-576	2,137	13,547	14,037	17,207
Alpha = 77%	1,093	1,435	4,207	-2,845	-2,390	323	9,068	9,558	12,728
Medical Lab. Technology									
Alpha = 100%	42,939	43,281	46,053	36,847	37,302	40,015	61,220	61,710	64,880
Alpha = 77%	31,866	32,208	34,980	26,879	27,334	30,047	45,922	46,412	49,582
Combined Technician									
Alpha = 100%	5,493	5,835	8,607	482	937	3,650	26,531	27,021	30,191
Alpha = 77%	2,873	3,215	5,987	-1,703	-1,248	1,465	19,212	19,702	22,872
Operating Room Nursing									
Alpha = 100%	-2,244	-2,073	N/A	-1,940	-1,712	N/A	-2,851	-2,606	N/A
Alpha = 77%	-2,597	-2,426	N/A	-2,458	-2,230	N/A	-3,368	-3,123	N/A

Note. N/A denotes not applicable; students were not eligible for training allowances.

Table [illegible]

Estimated Lifetime Private Earnings Differentials by Type of Student for the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earning Profiles and Alpha Coefficients

Program Alpha Coefficient	Year and Type of Student								
	1974			1975			1976		
	Self Supporting	Bursary Recipient	Allowance Recipient	Self Supporting	Bursary Recipient	Allowance Recipient	Self Supporting	Bursary Recipient	Allowance Recipient
Earning Profile A									
Nursing Assistant									
Alpha = 100%	$48,923	$49,265	$52,037	$46,126	$46,581	$49,295	$100,107	$100,599	$103,765
Alpha = 77%	36,897	37,239	40,011	34,605	35,060	37,774	76,069	76,561	79,727
Dental Assistant									
Alpha = 100%	49,425	49,767	52,539	48,455	48,910	51,624	83,019	83,511	86,677
Alpha = 77%	37,284	37,626	40,398	36,398	36,853	39,567	62,911	63,403	66,569
Earning Profile B									
Nursing Assistant									
Alpha = 100%	43,992	44,334	47,106	41,062	41,517	44,231	91,261	91,753	94,919
Alpha = 77%	33,101	33,442	36,214	30,705	31,160	33,874	69,257	69,749	72,915
Dental Assistant									
Alpha = 100%	44,465	44,807	47,579	43,239	43,694	46,408	75,283	75,775	78,941
Alpha = 77%	33,465	33,807	36,579	32,382	32,837	35,551	56,954	57,446	60,612
Earning Profile C									
Nursing Assistant									
Alpha = 100%	38,751	39,093	41,865	39,952	40,407	43,121	69,808	70,300	73,466
Alpha = 77%	29,065	29,407	32,179	29,851	30,306	33,020	52,739	53,231	56,397
Dental Assistant									
Alpha = 100%	41,237	41,579	44,351	43,769	44,224	46,938	64,242	64,734	67,900
Alpha = 77%	30,979	31,321	34,093	32,790	33,245	35,959	48,453	48,945	52,111

APPENDIX O

SOCIAL MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

Table 85

Average Social Monetary Returns to Health Personnel Training Using Earnings Profile A with Alternative Cost Bases and Alpha Coefficients

Program Year	Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
				5%		10%		15%		5%		10%		15%			
		PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Two Year Programs																	
Diploma Nursing Kelsey																	
1974	Alpha = 100%	6	6	21,248	19,619	7,869	6,240	1,841	212	2.6	2.3	1.6	1.4	1.1	1.0	17.4	15.2
	Alpha = 77%	7	8	13,267	11,638	2,965	1,336	N	N	2.0	1.8	1.2	1.1	N	N	12.8	11.1
1975	Alpha = 100%	7	8	15,428	13,491	3,840	1,903	N	N	1.9	1.7	1.2	1.1	N	N	13.2	11.4
	Alpha = 77%	9	11	8,119	6,182	N	N	N	N	1.5	1.3	N	N	N	N	9.3	8.0
1976	Alpha = 100%	5	6	33,291	30,608	12,999	10,316	3,939	1,256	2.8	2.4	1.7	1.5	1.2	1.1	18.7	16.0
	Alpha = 77%	7	8	21,328	18,645	5,704	3,021	N	N	2.1	1.9	1.3	1.1	N	N	13.8	11.8
Diploma Nursing Wascana																	
1974	Alpha = 100%	6	7	20,639	17,909	7,260	4,530	1,232	N	2.5	2.1	1.5	1.3	1.1	N	16.6	13.4
	Alpha = 77%	8	9	12,658	9,928	2,356	N	N	N	1.9	1.6	1.2	N	N	N	12.1	9.7
1975	Alpha = 100%	7	9	14,737	11,346	3,149	N	N	N	1.9	1.6	1.2	N	N	N	12.5	9.8
	Alpha = 77%	10	13	7,428	4,037	N	N	N	N	1.4	1.2	N	N	N	N	8.8	6.7
1976	Alpha = 100%	6	7	31,813	29,396	11,521	9,104	2,461	43	2.6	2.3	1.6	1.4	1.1	1.0	17.1	15.0
	Alpha = 77%	8	9	19,850	17,433	4,226	1,809	N	N	2.0	1.8	1.2	1.1	N	N	12.6	11.0
Psychiatric Nursing																	
1974	Alpha = 100%	7	10	30,110	21,354	9,746	990	1,172	N	3.0	1.9	1.7	1.0	1.1	N	16.1	10.4
	Alpha = 77%	9	12	19,721	10,965	4,040	N	N	N	2.3	1.5	1.3	N	N	N	12.6	7.9
1975	Alpha = 100%	8	11	27,500	18,822	6,851	N	N	N	2.5	1.7	1.4	N	N	N	13.6	9.3
	Alpha = 77%	10	14	16,841	8,164	942	N	N	N	1.9	1.3	1.1	N	N	N	10.5	7.0
1976	Alpha = 100%	7	8	44,052	38,028	15,270	9,246	3,048	N	3.0	2.4	1.7	1.3	1.1	N	17.0	13.4
	Alpha = 77%	8	10	28,912	22,888	6,750	726	N	N	2.3	1.8	1.3	1.0	N	N	13.2	10.3

Table 85 (continued)

Program Year	Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
				5%		10%		15%		5%		10%		15%			
		PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Dental Nursing																	
1974	Alpha = 100%	8	8	28,316	26,590	6,581	4,855	N	N	2.2	2.0	1.3	1.2	N	N	13.1	12.1
	Alpha = 77%	10	11	16,132	14,406	N	N	N	N	1.7	1.6	N	N	N	N	9.7	9.0
1975	Alpha = 100%	7	8	28,807	26,641	7,139	4,973	N	N	2.2	2.0	1.3	1.2	N	N	13.4	12.2
	Alpha = 77%	10	11	16,448	14,282	N	N	N	N	1.7	1.5	N	N	N	N	9.9	8.9
1976	Alpha = 100%	6	7	45,221	42,275	16,466	13,520	3,935	989	2.8	2.5	1.7	1.5	1.2	1.0	17.6	15.6
	Alpha = 77%	8	8	28,960	26,014	6,819	3,873	N	N	2.1	1.9	1.3	1.1	N	N	13.1	11.6
Health Record Administrator																	
1974	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976	Alpha = 100%	10	12	9,189	6,057	N	N	N	N	1.5	1.3	N	N	N	N	9.1	7.3
	Alpha = 77%	14	16	2,409	N	N	N	N	N	1.1	N	N	N	N	N	6.1	4.7
One Year or Less Programs																	
Nursing Assistant Kelsey																	
1974	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976	Alpha = 100%	7	8	1,334	25	N	N	N	N	1.1	1.0	N	N	N	N	a	a
	Alpha = 77%	12	16	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Table 85 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Nursing Assistant Wascana																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	8	-	292	N	N	N	N	N	1.0	N	N	N	N	N	a	<1
Alpha = 77%	15	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant Kelsey																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant Wascana																
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Medical Lab. Technology																
1974 Alpha = 100%	6	7	24,429	21,208	9,775	6,554	3,421	200	4.2	2.9	2.3	1.6	1.4	1.0	20.0	15.2
Alpha = 77%	7	9	16,421	13,200	5,165	1,944	297	N	3.1	2.2	1.7	1.2	1.0	N	15.4	11.6
1975 Alpha = 100%	7	8	15,887	13,502	4,908	2,523	N	N	2.8	2.2	1.6	1.2	N	N	14.9	12.1
Alpha = 77%	9	10	9,362	6,977	946	N	N	N	2.0	1.6	1.1	N	N	N	11.0	8.8
1976 Alpha = 100%	4	5	34,658	32,357	15,289	12,988	6,769	4,468	4.0	3.3	2.3	1.9	1.6	1.3	23.5	19.8
Alpha = 77%	6	7	24,040	21,739	9,126	6,825	2,565	264	3.1	2.6	1.8	1.5	1.2	1.0	18.3	15.3

Table 85 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Combined Technician																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	4	5	6,034	4,090	3,146	1,202	970	N	1.6	1.3	1.3	1.1	1.1	N	17.8	[a]
Alpha = 77%	6	8	2,165	221	40	N	N	N	1.2	1.0	1.0	N	N	N	[a]	[a]
Operating Room Nursing																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. PSC denotes the per student cost, PGC denotes the per graduate cost and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 86

Average Social Monetary Returns to Health Personnel Training Using Earnings Profile B with Alternative Cost Bases and Alpha Coefficients

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Two Year Programs																
Diploma Nursing Kelsey																
1974 Alpha = 100%	6	7	18,099	16,470	5,984	4,355	513	N	2.3	2.0	1.4	1.3	1.0	N	15.7	13.7
Alpha = 77%	8	9	10,842	9,213	1,514	N	N	N	1.8	1.6	1.1	N	N	N	11.4	9.9
1975 Alpha = 100%	8	9	12,235	10,298	1,888	N	N	N	1.7	1.6	1.1	N	N	N	11.6	10.0
Alpha = 77%	11	13	5,661	3,724	N	N	N	N	1.4	1.2	N	N	N	N	8.1	6.8
1976 Alpha = 100%	6	6	28,764	26,081	10,304	7,622	2,041	N	2.5	2.2	1.6	1.4	1.1	N	16.9	14.5
Alpha = 77%	8	9	17,842	15,159	3,629	946	N	N	2.0	1.7	1.2	1.0	N	N	12.4	10.6
Diploma Nursing Wascana																
1974 Alpha = 100%	7	7	17,489	14,759	5,375	2,645	N	N	2.2	1.9	1.4	1.2	N	N	14.9	12.0
Alpha = 77%	9	11	10,233	7,503	905	N	N	N	1.7	1.5	1.1	N	N	N	10.8	8.6
1975 Alpha = 100%	8	10	11,544	8,153	1,197	N	N	N	1.7	1.4	1.1	N	N	N	11.0	8.5
Alpha = 77%	11	14	4,970	1,579	N	N	N	N	1.3	1.1	N	N	N	N	7.6	5.7
1976 Alpha = 100%	6	7	27,286	24,869	8,827	6,410	563	N	2.4	2.1	1.4	1.3	1.0	N	15.5	13.6
Alpha = 77%	8	9	16,365	13,948	2,151	N	N	N	1.8	1.6	1.1	N	N	N	11.3	9.9
Psychiatric Nursing																
1974 Alpha = 100%	8	11	26,362	17,607	7,675	N	N	N	2.8	1.7	1.5	N	N	N	14.8	9.5
Alpha = 77%	4	13	16,836	8,080	2,446	N	N	N	2.1	1.3	1.2	N	N	N	11.6	7.2
1975 Alpha = 10C%	9	12	23,471	14,793	4,596	N	N	N	2.2	1.5	1.2	N	N	N	12.4	8.4
Alpha = 77%	11	15	13,739	5,061	N	N	N	N	1.7	1.2	N	N	N	N	9.6	6.2
1976 Alpha = 100%	7	9	38,728	32,704	12,280	6,256	1,017	N	2.8	2.2	1.6	1.2	1.0	N	15.7	12.3
Alpha = 77%	9	11	24,812	18,788	4,447	N	N	N	2.1	1.7	1.2	N	N	N	12.1	9.4

Table 86 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Dental Nursing																
1974 Alpha = 100%	8	9	24,148	22,423	4,171	2,445	N	N	2.0	1.9	1.2	1.1	N	N	12.0	11.1
Alpha = 77%	11	12	12,923	11,197	N	N	N	N	1.5	1.4	N	N	N	N	8.8	8.1
1975 Alpha = 100%	8	9	24,385	22,220	4,553	2,387	N	N	2.0	1.8	1.2	1.1	N	N	12.2	11.1
Alpha = 77%	11	12	13,044	10,877	N	N	N	N	1.5	1.4	N	N	N	N	8.9	8.0
1976 Alpha = 100%	6	7	39,646	36,700	13,224	10,278	1,674	N	2.6	2.3	1.5	1.4	1.1	N	16.1	14.3
Alpha = 77%	8	9	24,668	21,722	4,323	1,377	N	N	2.0	1.8	1.2	1.1	N	N	12.0	10.6
Health Record Administrator																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	11	14	5,850	2,718	N	N	N	N	1.3	1.1	N	N	N	N	7.6	6.1
Alpha = 77%	16	19	N	N	N	N	N	N	N	N	N	N	N	N	4.9	3.7
One Year or Less Programs																
Nursing Assistant Kelsey																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	8	14	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Table 86 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Nursing Assistant Wascana																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant Kelsey																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant Wascana																
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Medical Lab. Technology																
1974 Alpha = 100%	6	7	21,492	18,271	8,182	4,961	2,399	N	3.8	2.7	2.1	1.5	1.3	N	18.6	14.0
Alpha = 77%	7	9	14,196	10,975	3,974	753	N	N	2.8	2.0	1.5	1.1	N	N	14.3	10.6
1975 Alpha = 100%	7	9	13,171	10,786	3,403	1,018	N	N	2.5	2.0	1.4	1.1	N	N	13.5	10.9
Alpha = 77%	9	11	7,322	4,937	N	N	N	N	1.8	1.4	N	N	N	N	9.8	7.8
1976 Alpha = 100%	5	6	30,519	28,218	12,935	10,634	5,181	2,880	3.7	3.0	2.1	1.8	1.5	1.2	21.6	18.1
Alpha = 77%	6	7	20,851	18,550	7,312	5,011	1,342	N	2.8	2.3	1.6	1.4	1.1	N	16.8	13.9

Table 86 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Combined Technician																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	4	6	3,536	1,592	1,462	N	N	N	1.3	1.1	1.1	N	N	N	a	a
Alpha = 77%	7	10	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Operating Room Nursing																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. PSC denotes the per student cost, PGC denotes the per graduate cost and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 87

Average Social Monetary Returns to Health Personnel Training Using Earnings Profile C with Alternative Cost Bases and Alpha Coefficients

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Two Year Programs																
Diploma Nursing Kelsey																
1974 Alpha = 100%	9	11	11,313	9,685	906	N	N	N	1.8	1.6	1.1	N	N	N	10.8	9.4
Alpha = 77%	13	15	5,617	3,988	N	N	N	N	1.4	1.3	N	N	N	N	7.9	6.9
1975 Alpha = 100%	12	13	8,035	6,098	N	N	N	N	1.5	1.3	N	N	N	N	8.5	7.4
Alpha = 77%	16	19	2,427	490	N	N	N	N	1.2	1.0	N	N	N	N	6.1	5.2
1976 Alpha = 100%	9	10	17,344	14,661	2,188	N	N	N	1.9	1.7	1.1	N	N	N	11.4	9.7
Alpha = 77%	12	14	9,049	6,366	N	N	N	N	1.5	1.3	N	N	N	N	8.4	7.1
Diploma Nursing Wascana																
1974 Alpha = 100%	10	12	10,704	7,974	297	N	N	N	1.8	1.5	1.0	N	N	N	10.2	8.3
Alpha = 77%	13	17	5,008	2,278	N	N	N	N	1.4	1.1	N	N	N	N	7.5	6.0
1975 Alpha = 100%	12	16	7,344	3,953	N	N	N	N	1.4	1.2	N	N	N	N	8.1	6.4
Alpha = 77%	17	22	1,736	N	N	N	N	N	1.1	N	N	N	N	N	5.7	4.4
1976 Alpha = 100%	10	11	15,866	13,449	710	N	N	N	1.8	1.6	1.0	N	N	N	10.4	9.1
Alpha = 77%	13	15	7,571	5,154	N	N	N	N	1.4	1.2	N	N	N	N	7.6	6.6
Psychiatric Nursing																
1974 Alpha = 100%	10	16	14,709	5,953	690	N	N	N	2.0	1.3	1.1	N	N	N	10.4	6.5
Alpha = 77%	13	20	7,862	N	N	N	N	N	1.5	N	N	N	N	N	8.1	4.8
1975 Alpha = 100%	12	17	12,653	3,975	N	N	N	N	1.7	1.1	N	N	N	N	8.9	5.9
Alpha = 77%	15	22	5,409	N	N	N	N	N	1.3	N	N	N	N	N	6.8	4.2
1976 Alpha = 100%	10	13	20,939	14,915	1,394	N	N	N	2.0	1.5	1.1	N	N	N	10.6	8.3
Alpha = 77%	13	16	11,115	5,091	N	N	N	N	1.5	1.2	N	N	N	N	8.1	6.2

Table 87 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Dental Nursing																
1974 Alpha = 100%	13	14	9,618	7,892	N	N	N	N	1.4	1.3	N	N	N	N	7.7	7.1
Alpha = 77%	18	19	1,734	8	N	N	N	N	1.1	1.0	N	N	N	N	5.5	5.0
1975 Alpha = 100%	13	14	10,888	8,722	N	N	N	N	1.4	1.3	N	N	N	N	8.0	7.2
Alpha = 77%	17	19	2,651	485	N	N	N	N	1.1	1.0	N	N	N	N	5.8	5.1
1976 Alpha = 100%	10	11	20,336	17,390	812	N	N	N	1.8	1.6	1.0	N	N	N	10.4	9.1
Alpha = 77%	13	15	9,799	6,853	N	N	N	N	1.4	1.2	N	N	N	N	7.6	6.7
Health Record Administrator																
1974 Alpha = 100%	27	31	N	N	N	N	N	N	N	N	N	N	N	N	2.6	1.2
Alpha = 77%	31	-	N	N	N	N	N	N	N	N	N	N	N	N	1.2	<1
1975 Alpha = 100%	36	-	N	N	N	N	N	N	N	N	N	N	N	N	0.5	<1
Alpha = 77%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	17	22	3,436	304	N	N	N	N	1.2	1.0	N	N	N	N	6.2	5.1
Alpha = 77%	22	24	N	N	N	N	N	N	N	N	N	N	N	N	4.3	3.3
One Year or Less Programs																
Nursing Assistant Kelsey																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	11	14	4,737	3,428	N	N	N	N	1.5	1.3	N	N	N	N	8.8	7.4
Alpha = 77%	19	23	1,370	61	N	N	N	N	1.1	1.0	N	N	N	N	6.1	5.0

Table 87 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Nursing Assistant Wascana																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	13	17	3,695	2,346	N	N	N	N	1.3	1.2	N	N	N	N	7.6	6.5
Alpha = 77%	23	24	328	N	N	N	N	N	1.0	N	N	N	N	N	5.2	4.3
Dental Assistant Kelsey																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	27	30	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Alpha = 77%	31	34	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Dental Assistant Wascana																
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	30	32	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Alpha = 77%	34	39	N	N	N	N	N	N	N	N	N	N	N	N	a	a

Table 87 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Medical Lab. Technology																
1974 Alpha = 100%	7	9	15,418	12,197	4,374	1,153	N	N	3.0	2.1	1.6	1.1	N	N	15.0	11.0
Alpha = 77%	9	12	9,785	6,564	1,294	N	N	N	2.3	1.6	1.2	N	N	N	11.5	8.3
1975 Alpha = 100%	8	10	11,491	9,106	1,750	N	N	N	2.3	1.8	1.2	N	N	N	11.8	9.5
Alpha = 77%	11	14	6,376	3,991	N	N	N	N	1.7	1.4	N	N	N	N	8.9	7.0
1976 Alpha = 100%	6	7	21,486	19,185	6,814	4,513	909	N	2.9	2.4	1.6	1.3	1.1	N	16.2	13.4
Alpha = 77%	8	10	13,898	11,597	2,601	300	N	N	2.2	1.8	1.2	1.0	N	N	12.4	10.2
Combined Technician																
1974 Alpha = 100%	44	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	6	8	7,579	5,635	1,387	N	N	N	1.7	1.5	1.1	N	N	N	12.2	9.3
Alpha = 77%	10	15	3,473	1,529	N	N	N	N	1.3	1.1	N	N	N	N	8.1	6.1
Operating Room Nursing																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. PSC denotes the per student cost, PGC denotes the per graduate cost and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 88

Average Social Monetary Returns to Nursing Assistant and Dental Assistant Training Using a Grade 11 Reference Group with Alternative Earnings Profiles, Cost Bases and Alpha Coefficients

Program Year	Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
				5%		10%		15%		5%		10%		15%			
		PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Earnings Profile A																	
Nursing Assistant Kelsey																	
1974	Alpha = 100%	4	5	22,244	20,878	10,448	9,082	5,317	3,952	4.3	3.6	2.6	2.1	1.8	1.5	28.5	23.3
	Alpha = 77%	5	6	15,598	14,232	6,515	5,149	2,565	1,199	3.3	2.8	2.0	1.6	1.4	1.2	21.5	17.5
1975	Alpha = 100%	4	5	21,735	21,143	9,705	9,113	4,439	3,847	3.7	3.5	2.2	2.1	1.6	1.5	24.4	22.6
	Alpha = 77%	6	6	14,884	14,292	5,621	5,029	1,566	974	2.9	2.7	1.7	1.6	1.2	1.1	18.3	16.9
1976	Alpha = 100%	3	3	51,334	50,162	26,161	24,989	15,383	14,211	6.8	6.0	4.0	3.5	2.7	2.4	43.7	38.3
	Alpha = 77%	3	4	37,487	36,315	18,104	16,932	9,805	8,633	5.2	4.6	3.0	2.7	2.1	1.9	33.1	29.0
Nursing Assistant Wascana																	
1974	Alpha = 100%	4	5	21,948	20,277	10,152	8,481	5,021	3,351	4.2	3.4	2.5	2.0	1.7	1.4	27.2	21.5
	Alpha = 77%	5	6	15,302	13,631	6,219	4,548	2,269	598	3.2	2.6	1.9	1.5	1.3	1.1	20.5	16.2
1975	Alpha = 100%	5	5	21,362	19,850	9,332	7,820	4,066	2,554	3.5	3.0	2.1	1.8	1.5	1.3	23.2	19.4
	Alpha = 77%	6	7	14,511	12,999	5,248	3,736	1,193	N	2.7	2.3	1.6	1.4	1.1	N	17.4	14.5
1976	Alpha = 100%	3	3	50,292	49,070	25,119	23,897	14,341	13,119	6.1	5.4	3.5	3.2	2.5	2.2	38.8	34.3
	Alpha = 77%	4	4	36,445	35,223	17,062	15,840	8,763	7,541	4.7	4.2	2.7	2.4	1.9	1.7	29.4	26.0
Dental Assistant Kelsey																	
1974	Alpha = 100%	5	6	20,778	19,139	8,794	7,155	3,736	2,097	4.2	3.3	2.3	1.9	1.6	1.3	23.1	18.7
	Alpha = 77%	6	7	14,491	12,852	5,264	3,625	1,369	N	3.2	2.6	1.8	1.4	1.2	N	18.0	14.5
1975	Alpha = 100%	5	7	21,419	18,794	8,883	6,258	3,556	931	3.9	2.9	2.2	1.6	1.5	1.1	21.9	16.4
	Alpha = 77%	6	8	14,768	12,143	5,115	2,490	1,013	N	3.0	2.2	1.7	1.3	1.1	N	17.0	12.6
1976	Alpha = 100%	4	4	38,170	35,943	17,822	15,595	9,258	7,031	5.4	4.3	3.0	2.4	2.1	1.6	30.6	24.5
	Alpha = 77%	5	6	27,382	25,155	11,714	9,487	5,120	2,893	4.1	3.3	2.3	1.9	1.6	1.3	23.7	19.0
Dental Assistant Wascana																	
1975	Alpha = 100%	5	5	21,250	21,122	8,714	8,586	3,387	3,259	3.8	3.7	2.1	2.1	1.4	1.4	21.4	21.1
	Alpha = 77%	6	7	14,599	14,471	4,946	4,818	844	716	2.9	2.9	1.6	1.6	1.1	1.1	16.6	16.4
1976	Alpha = 100%	5	5	35,738	34,205	15,390	13,858	6,826	5,294	4.2	3.7	2.4	2.1	1.6	1.4	24.1	21.2
	Alpha = 77%	6	7	24,949	23,418	9,282	7,750	2,688	1,156	3.2	2.8	1.8	1.6	1.2	1.1	18.6	16.4

Table 88 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Earnings Profile B																
Nursing Assistant Kelsey																
1974 Alpha = 100%	4	5	19,497	18,131	8,717	7,351	4,070	2,704	3.9	3.3	2.3	1.9	1.6	1.3	25.4	20.6
Alpha = 77%	6	7	13,483	12,117	5,182	3,816	1,604	238	3.0	2.5	1.8	1.5	1.2	1.0	19.0	15.5
1975 Alpha = 100%	5	5	18,744	18,152	7,797	7,204	3,056	2,464	3.3	3.1	2.0	1.8	1.4	1.3	21.5	19.8
Alpha = 77%	6	7	12,581	11,989	4,151	3,559	501	N	2.6	2.4	1.5	1.4	1.1	N	16.0	14.8
1976 Alpha = 100%	3	3	46,461	45,289	23,202	22,030	13,275	12,103	6.2	5.5	3.6	3.2	2.5	2.2	39.8	34.9
Alpha = 77%	4	4	33,734	32,562	15,825	14,653	8,181	7,010	4.8	4.2	2.8	2.5	1.9	1.7	30.1	26.4
Nursing Assistant Wascana																
1974 Alpha = 100%	4	5	19,201	17,530	8,421	6,750	3,774	2,103	3.8	3.1	2.2	1.8	1.5	1.2	24.2	19.1
Alpha = 77%	6	7	13,187	11,516	4,886	3,214	1,308	N	2.9	2.3	1.7	1.4	1.2	N	18.1	14.3
1975 Alpha = 100%	5	6	18,371	16,859	7,423	5,911	2,683	1,171	3.2	2.7	1.9	1.6	1.3	1.1	20.4	17.0
Alpha = 77%	7	8	12,208	10,696	3,778	2,266	128	N	2.5	2.1	1.5	1.2	1.0	N	15.3	12.7
1976 Alpha = 100%	3	4	45,418	44,197	22,160	20,938	12,233	11,010	5.6	5.0	3.2	2.9	2.2	2.0	35.3	31.2
Alpha = 77%	4	5	32,692	31,470	14,783	13,561	7,140	5,918	4.3	3.8	2.5	2.2	1.7	1.5	26.7	23.6
Dental Assistant Kelsey																
1974 Alpha = 100%	5	6	18,219	16,580	7,290	5,651	2,718	1,079	3.8	3.0	2.1	1.7	1.4	1.1	21.0	16.9
Alpha = 77%	7	8	12,521	10,882	4,106	2,467	585	N	2.9	2.3	1.6	1.3	1.1	N	16.3	13.1
1975 Alpha = 100%	5	7	18,591	15,966	7,203	4,578	2,413	N	3.5	2.6	2.0	1.5	1.3	N	19.8	14.7
Alpha = 77%	7	9	12,590	9,965	3,821	1,196	133	N	2.7	2.0	1.5	1.1	1.0	N	15.3	11.3
1976 Alpha = 100%	4	5	34,156	31,929	15,472	13,245	7,654	5,427	3.9	4.0	2.8	2.2	1.9	1.5	28.1	22.4
Alpha = 77%	5	6	24,291	22,064	9,905	7,678	3,884	1,657	3.8	3.0	2.1	1.7	1.4	1.2	21.7	17.3
Dental Assistant Wascana																
1975 Alpha = 100%	6	6	18,422	18,294	7,034	6,906	2,244	2,116	3.4	3.4	1.9	1.9	1.3	1.3	19.3	19.0
Alpha = 77%	7	7	12,421	12,293	3,652	3,524	N	N	2.6	2.6	1.5	1.5	N	N	14.9	14.7
1976 Alpha = 100%	5	6	31,724	30,192	13,040	11,508	5,222	3,690	3.8	3.4	2.2	1.9	1.5	1.3	22.0	19.4
Alpha = 77%	6	7	21,859	20,327	7,473	5,941	1,452	N	3.0	2.6	1.7	1.5	1.1	N	17.0	14.9

Table 88 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC	PSC	PGC
Earnings Profile C																
Nursing Assistant Kelsey																
1974 Alpha = 100%	4	5	15,302	13,936	6,418	5,052	2,719	1,353	3.3	2.7	2.0	1.6	1.4	1.2	23.1	18.2
Alpha = 77%	6	8	10,253	8,887	3,412	2,046	564	N	2.5	2.1	1.5	1.3	1.1	N	16.6	13.2
1975 Alpha = 100%	5	5	15,555	14,963	6,070	5,478	2,122	1,530	3.0	2.7	1.8	1.6	1.3	1.1	20.2	18.4
Alpha = 77%	7	8	10,125	9,533	2,822	2,230	N	N	2.3	2.1	1.4	1.3	N	N	14.5	13.3
1976 Alpha = 100%	3	3	31,689	30,517	14,962	13,790	7,990	6,818	4.6	4.0	2.7	2.4	1.9	1.7	32.7	28.0
Alpha = 77%	4	5	22,361	21,189	9,480	8,308	4,112	2,940	3.5	3.1	2.1	1.8	1.5	1.3	23.6	20.3
Nursing Assistant Wascana																
1974 Alpha = 100%	4	6	15,006	13,335	6,122	4,451	2,423	752	3.2	2.6	1.9	1.5	1.4	1.1	21.8	16.6
Alpha = 77%	6	8	9,957	8,286	3,116	1,445	268	N	2.4	2.0	1.5	1.2	1.0	N	15.7	12.1
1975 Alpha = 100%	5	6	15,182	13,670	5,697	4,185	1,749	237	2.8	2.4	1.7	1.4	1.2	1.0	19.0	15.4
Alpha = 77%	7	9	9,752	8,240	2,449	937	N	N	2.2	1.8	1.3	1.1	N	N	13.7	11.2
1976 Alpha = 100%	2	4	30,647	29,425	13,920	12,698	6,948	5,726	4.1	3.6	2.4	2.1	1.7	1.5	28.4	24.7
Alpha = 77%	5	6	21,319	20,096	8,438	7,216	3,070	1,848	3.2	2.8	1.9	1.7	1.3	1.2	20.7	18.0
Dental Assistant Kelsey																
1974 Alpha = 100%	4	4	16,187	14,548	6,975	5,336	3,140	1,501	3.5	2.8	2.1	1.7	1.5	1.2	24.2	18.4
Alpha = 77%	5	7	10,956	9,317	3,863	2,224	910	N	2.7	2.1	1.6	1.3	1.1	N	17.6	13.4
1975 Alpha = 100%	4	5	17,517	14,892	7,504	4,880	3,324	699	3.3	2.5	2.0	1.5	1.4	1.1	23.7	16.3
Alpha = 77%	5	8	11,763	9,138	4,054	1,429	834	N	2.6	1.9	1.5	1.1	1.1	N	17.1	11.8
1976 Alpha = 100%	5	4	27,212	24,985	12,652	10,425	6,581	4,354	4.1	3.3	2.5	2.0	1.8	1.4	29.7	22.5
Alpha = 77%	4	5	18,944	16,717	7,733	5,506	3,059	832	3.2	2.5	1.9	1.5	1.4	1.1	21.6	16.4
Dental Assistant Wascana																
1975 Alpha = 100%	4	4	17,348	17,220	7,336	7,208	3,155	3,027	3.3	3.2	2.0	1.9	1.4	1.4	23.0	22.6
Alpha = 77%	5	5	11,594	11,466	3,885	3,757	665	537	2.5	2.5	1.5	1.5	1.1	1.1	16.6	16.3
1976 Alpha = 100%	4	4	24,780	23,248	10,220	8,688	4,149	2,617	3.3	2.8	1.9	1.7	1.4	1.2	22.0	18.8
Alpha = 77%	6	7	16,512	14,980	5,301	3,769	627	N	2.5	2.2	1.5	1.3	1.1	N	16.0	13.7

Note. PSC denotes the per student cost, PGC denotes the per graduate cost and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1.

APPENDIX P

PRIVATE MONETARY RETURNS TO HEALTH PERSONNEL TRAINING

Table 89

Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile A with Alternative Alpha Coefficients

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Two Year Programs																
Diploma Nursing																
1974 Alpha = 100%	5	4	19,351	20,035	8,712	9,396	3,914	4,598	3.4	3.7	2.1	2.3	1.5	1.6	23.5	25.9
Alpha = 77%	6	5	13,025	13,710	4,833	5,517	1,139	1,823	2.6	2.8	1.6	1.7	1.1	1.2	17.5	19.3
1975 Alpha = 100%	5	5	13,125	14,035	4,958	5,868	1,135	2,045	2.4	2.6	1.5	1.7	1.1	1.2	17.3	19.6
Alpha = 77%	7	7	7,879	8,789	1,590	2,500	N	N	1.8	2.0	1.2	1.3	N	N	12.3	14.0
1976 Alpha = 100%	4	4	29,308	30,288	13,652	14,632	6,691	7,671	3.8	4.1	2.3	2.5	1.6	1.8	26.1	29.1
Alpha = 77%	5	5	20,116	21,096	8,061	9,041	2,702	3,682	2.9	3.2	1.8	1.9	1.3	1.4	19.5	21.7
Psychiatric Nursing																
1974 Alpha = 100%	6	6	24,775	25,459	10,155	10,839	3,940	4,624	4.0	4.4	2.3	2.5	1.5	1.6	21.5	23.3
Alpha = 77%	7	6	17,202	17,886	5,945	6,629	1,159	1,843	3.1	3.4	1.7	1.9	1.1	1.3	17.0	18.4
1975 Alpha = 100%	6	6	25,385	26,295	9,749	10,659	3,137	4,047	3.6	4.0	2.0	2.2	1.3	1.5	19.4	21.3
Alpha = 77%	7	7	17,319	18,229	5,279	6,190	188	1,098	2.8	3.1	1.6	1.7	1.0	1.1	15.3	16.7
1976 Alpha = 100%	5	4	40,143	41,123	17,900	18,880	8,483	9,463	4.8	5.3	2.7	3.0	1.8	2.0	26.3	28.9
Alpha = 77%	6	5	28,459	29,439	11,331	12,312	4,081	5,061	3.7	4.0	2.1	2.3	1.4	1.5	20.5	22.5
Dental Nursing																
1974 Alpha = 100%	3	3	30,440	31,123	14,819	15,503	7,968	8,652	4.7	5.2	2.8	3.1	2.0	2.2	31.2	34.1
Alpha = 77%	5	4	21,564	22,248	9,536	10,220	4,261	4,945	3.7	4.0	2.2	2.4	1.5	1.7	23.7	26.0
1975 Alpha = 100%	4	3	30,732	31,642	14,462	15,372	7,332	8,242	4.2	4.6	2.5	2.8	1.8	2.7	27.8	30.9
Alpha = 77%	5	5	21,436	22,346	8,908	9,818	3,418	4,329	3.2	3.6	1.9	2.1	1.4	1.5	21.0	23.3
1976 Alpha = 100%	3	3	43,152	44,132	21,290	22,270	11,776	12,756	5.1	5.6	3.0	3.3	2.1	2.3	33.5	37.1
Alpha = 77%	4	4	30,776	31,756	13,943	14,923	6,616	7,596	3.9	4.3	2.3	2.5	1.6	1.8	25.4	28.2

Table 89 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Health Record Administrator																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	6	5	11,780	12,760	3,845	4,825	96	1,076	2.1	2.3	1.4	1.5	1.0	1.1	15.2	17.2
Alpha = 77%	8	7	6,620	7,600	510	1,490	N	N	1.6	1.8	1.1	1.2	N	N	10.7	12.2
One Year or Less Programs																
Nursing Assistant																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	4	3	2,569	3,059	1,590	2,080	668	1,158	1.5	1.6	1.2	1.4	1.1	1.2	a	a
Alpha = 77%	6	5	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Medical Lab. Technology																
1974 Alpha = 100%	4	4	19,353	19,695	8,792	9,134	4,148	4,490	5.8	6.3	3.2	3.5	2.0	2.2	25.4	26.8
Alpha = 77%	6	5	13,460	13,802	5,351	5,693	1,796	2,138	4.3	4.7	2.3	2.5	1.4	1.6	19.6	20.8
1975 Alpha = 100%	6	5	12,093	12,548	4,543	4,998	1,085	1,540	3.5	3.9	2.0	2.2	1.2	1.4	17.5	18.8
Alpha = 77%	8	7	7,489	7,944	1,709	2,164	N	N	2.6	2.8	1.4	1.5	N	N	12.9	13.8
1976 Alpha = 100%	3	3	29,969	30,459	15,228	15,718	8,744	9,234	6.7	7.4	3.9	4.3	2.7	2.9	37.1	40.3
Alpha = 77%	4	4	21,859	22,349	10,509	10,999	5,516	6,006	5.1	5.7	3.0	3.3	2.0	2.3	29.6	32.2

Table 89 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Combined Technician																
1974 Alpha = 100%	–	4	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	3	3	6,422	6,912	4,621	5,111	3,128	3,618	2.2	2.4	1.9	2.1	1.6	1.8	[a]	[a]
Alpha = 77%	4	3	3,609	4,099	2,322	2,812	1,188	1,678	1.7	1.9	1.4	1.6	1.2	1.4	[a]	[a]
Operating Room Nursing																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 100%	37	37	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. SSS denotes Self-Supporting Students, BR denotes Bursary Recipient, and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 90

Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile B with Alternative Alpha Coefficients

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Two Year Programs																
Diploma Nursing																
1974 Alpha = 100%	5	4	16,763	17,447	7,167	7,851	2,829	3,513	3.1	3.3	1.9	2.1	1.4	1.5	21.2	23.4
Alpha = 77%	6	6	11,033	11,717	3,644	4,328	304	988	2.4	2.6	1.5	1.6	1.0	1.1	15.7	17.3
1975 Alpha = 100%	6	5	10,595	11,505	3,406	4,316	31	941	2.1	2.3	1.4	1.5	1.0	1.1	15.1	17.1
Alpha = 77%	8	7	5,931	6,841	395	1,305	N	N	1.6	1.8	1.0	1.2	N	N	10.6	12.1
1976 Alpha = 100%	4	4	25,649	26,629	11,478	12,458	5,165	6,146	3.4	3.8	2.1	2.3	1.5	1.6	23.6	26.4
Alpha = 77%	6	5	17,298	18,278	6,387	7,367	1,526	2,506	2.6	2.9	1.6	1.8	1.1	1.3	17.5	19.6
Psychiatric Nursing																
1974 Alpha = 100%	6	6	21,863	22,547	8,520	9,204	2,838	3,522	3.7	4.0	2.1	2.2	1.4	1.5	19.7	21.4
Alpha = 77%	7	7	14,960	15,644	4,686	5,370	311	995	2.8	3.1	1.6	1.7	1.0	1.1	15.5	16.8
1975 Alpha = 100%	7	6	22,143	23,054	7,925	8,835	1,905	2,815	3.3	3.6	1.8	2.0	1.2	1.3	17.7	19.4
Alpha = 77%	8	7	14,824	15,734	3,875	4,785	N	150	2.5	2.8	1.4	1.6	N	1.0	13.9	15.2
1976 Alpha = 100%	5	5	35,848	36,828	15,478	16,458	6,837	7,817	4.4	4.8	2.5	2.7	1.7	1.8	24.2	26.5
Alpha = 77%	6	6	25,152	26,132	9,468	10,448	2,814	3,794	3.4	3.7	1.9	2.1	1.3	1.4	18.8	20.6
Dental Nursing																
1974 Alpha = 100%	4	3	27,228	27,912	12,945	13,630	6,663	7,347	4.3	4.7	2.6	2.8	1.8	2.0	28.6	31.4
Alpha = 77%	5	5	19,091	19,775	8,094	8,778	3,256	3,940	3.3	3.7	2.0	2.2	1.4	1.5	21.7	23.8
1975 Alpha = 100%	4	4	27,215	28,126	12,402	13,312	5,895	6,806	3.8	4.2	2.3	2.5	1.6	1.8	25.4	28.2
Alpha = 77%	5	5	18,729	19,638	7,322	8,232	2,312	3,222	3.0	3.2	1.8	1.9	1.2	1.4	19.1	21.2
1976 Alpha = 100%	3	3	38,711	39,691	18,704	19,684	9,973	10,953	4.6	5.1	2.8	3.0	1.9	2.1	30.8	34.1
Alpha = 77%	5	4	27,357	28,336	11,951	12,931	5,228	6,208	3.6	3.9	2.1	2.3	1.5	1.6	23.3	25.8

Table 90 (continued)

Program Year	Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
				5%		10%		15%		5%		10%		15%			
		SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Health Record Administrator																	
1974	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976	Alpha = 100%	7	6	9,026	10,006	2,095	3,075	N	N	1.9	2.0	1.2	1.3	N	N	12.8	14.6
	Alpha = 77%	10	9	4,500	5,480	N	142	N	N	1.4	1.6	N	1.0	N	N	8.9	10.2
One Year or Less Programs																	
Nursing Assistant																	
1974	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976	Alpha = 100%	4	4	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
	Alpha = 77%	7	6	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Dental Assistant																	
1974	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976	Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Medical Lab. Technology																	
1974	Alpha = 100%	5	4	17,052	17,394	7,534	7,876	3,340	3,682	5.2	5.7	2.9	3.1	1.8	2.0	23.6	25.1
	Alpha = 77%	6	6	11,719	12,061	4,411	4,753	1,202	1,544	3.9	4.3	2.1	2.3	1.3	1.4	18.2	19.3
1975	Alpha = 100%	6	6	9,966	10,421	3,365	3,820	334	789	3.1	3.4	1.7	1.9	1.1	1.2	15.8	17.0
	Alpha = 77%	8	8	5,896	6,351	843	1,298	N	N	2.2	2.5	1.2	1.3	N	N	11.5	12.4
1976	Alpha = 100%	3	3	26,622	27,112	13,321	13,811	7,459	7,949	6.0	6.7	3.5	3.9	2.4	2.7	34.4	37.4
	Alpha = 77%	4	4	19,280	19,770	9,039	9,529	4,525	5,015	4.6	5.1	2.7	3.0	1.9	2.0	27.3	29.8

Table 90 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Combined Technician																
1974 Alpha = 100%	–	4	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	3	3	4,369	4,859	3,245	3,736	2,113	2,603	1.8	2.0	1.6	1.8	1.4	1.6	a	a
Alpha = 77%	4	3	1,962	2,452	1,245	1,735	400	890	1.4	1.5	1.2	1.4	1.1	1.2	a	a
Operating Room Nursing																
1974 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 100%	–	39	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
Alpha = 77%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	–	–	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. SSS denotes Self-Supporting Students, BR denotes Bursary Recipient, and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 91

Average Private Monetary Returns to Health Personnel Training for Self-Supporting Students and Bursary Recipients Using Earnings Profile C with Alternative Alpha Coefficients

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Two Year Programs																
Diploma Nursing																
1974 Alpha = 100%	7	6	11,957	12,641	3,438	4,122	N	671	2.5	2.7	1.4	1.6	N	1.1	15.0	16.6
Alpha = 77%	9	8	7,332	8,016	773	1,457	N	N	1.9	2.1	1.1	1.2	N	N	11.1	12.3
1975 Alpha = 100%	8	7	9,080	9,990	1,282	2,192	N	N	1.9	2.1	1.1	1.2	N	N	11.6	13.1
Alpha = 77%	12	10	4,764	5,674	N	N	N	N	1.5	1.7	N	N	N	N	8.5	9.5
1976 Alpha = 100%	6	5	17,993	18,973	5,825	6,805	913	1,893	2.7	3.0	1.6	1.7	1.1	1.2	16.5	18.4
Alpha = 77%	8	7	11,403	12,383	2,034	3,014	N	N	2.1	2.3	1.2	1.3	N	N	12.2	13.6
Psychiatric Nursing																
1974 Alpha = 100%	8	7	14,451	15,135	3,870	4,554	N	369	2.8	3.0	1.5	1.6	N	1.1	14.5	15.7
Alpha = 77%	10	9	9,253	9,937	1,105	1,789	N	N	2.1	2.3	1.1	1.2	N	N	11.3	12.3
1975 Alpha = 100%	8	8	15,074	15,894	3,413	4,324	N	N	2.6	2.8	1.4	1.5	N	N	13.3	14.6
Alpha = 77%	11	10	9,380	10,290	401	1,311	N	N	2.0	2.2	1.0	1.2	N	N	10.4	11.4
1976 Alpha = 100%	7	6	23,213	24,193	7,637	8,617	1,453	2,433	3.2	3.5	1.7	1.9	1.1	1.3	17.0	18.7
Alpha = 77%	8	8	15,423	16,403	3,429	4,409	N	N	2.5	2.7	1.3	1.5	N	N	13.2	14.5
Dental Nursing																
1974 Alpha = 100%	5	5	17,740	18,424	6,650	7,334	2,135	2,819	3.2	3.5	1.8	2.0	1.3	1.4	19.4	21.4
Alpha = 77%	7	6	11,785	12,469	3,246	3,930	N	454	2.5	2.7	1.4	1.5	N	1.1	14.5	16.0
1975 Alpha = 100%	6	5	18,243	19,153	6,263	7,173	1,421	2,331	2.9	3.2	1.7	1.8	1.2	1.3	17.5	19.6
Alpha = 77%	8	7	11,820	12,730	2,595	3,505	N	N	2.2	2.5	1.3	1.4	N	N	13.1	14.6
1976 Alpha = 100%	5	4	25,232	26,212	9,859	10,839	3,624	4,604	3.4	3.7	1.9	2.1	1.3	1.5	20.9	23.3
Alpha = 77%	6	6	16,978	17,958	5,141	6,121	340	1,320	2.6	2.9	1.5	1.6	1.0	1.1	15.5	17.3

Table 91 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Health Record Administrator																
1974 Alpha = 100%	22	21	499	1,183	N	N	N	N	1.1	1.2	N	N	N	N	5.4	6.1
Alpha = 77%	25	24	N	N	N	N	N	N	N	N	N	N	N	N	3.7	4.2
1975 Alpha = 100%	26	25	N	N	N	N	N	N	N	N	N	N	N	N	3.3	3.9
Alpha = 77%	29	28	N	N	N	N	N	N	N	N	N	N	N	N	1.9	2.4
1976 Alpha = 100%	10	9	8,371	9,351	154	1,134	N	N	1.8	2.0	1.0	1.1	N	N	10.2	11.3
Alpha = 77%	14	13	3,995	4,974	N	N	N	N	1.4	1.5	N	N	N	N	7.5	8.4
One Year or Less Programs																
Nursing Assistant																
1974 Alpha = 100%	29	28	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Alpha = 77%	32	32	N	N	N	N	N	N	N	N	N	N	N	N	a	a
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	5	5	6,496	6,986	1,887	2,377	92	582	2.2	2.5	1.4	1.5	1.0	1.1	15.4	17.8
Alpha = 77%	8	7	3,785	4,275	236	726	N	N	1.7	1.9	1.0	1.2	N	N	10.6	12.1
Dental Assistant																
1974 Alpha = 100%	31	30	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Alpha = 77%	35	34	N	N	N	N	N	N	N	N	N	N	N	N	a	a
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	8	7	2,489	2,979	N	75	N	N	1.5	1.6	N	1.0	N	N	a	a
Alpha = 77%	26	12	642	1,132	N	N	N	N	1.1	1.2	N	N	N	N	a	a

Table 91 (continued)

Program Year Alpha Coefficient	Payback Period (Years)		Present Value ($)						Benefit/Cost Ratios						Internal Rate of Return (%)	
			5%		10%		15%		5%		10%		15%			
	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR	SSS	BR
Medical Lab. Technology																
1974 Alpha = 100%	5	4	13,712	14,054	5,250	5,592	1,889	2,231	4.4	4.8	2.3	2.5	1.5	1.6	20.7	22.2
Alpha = 77%	7	6	9,375	9,716	2,870	3,212	293	635	3.3	3.6	1.7	1.9	1.1	1.2	15.9	17.1
1975 Alpha = 100%	6	6	10,569	11,024	3,111	3,566	186	641	3.2	3.5	1.6	1.8	1.0	1.2	15.5	16.8
Alpha = 77%	8	8	6,664	7,119	938	1,393	N	N	2.4	2.6	1.2	1.3	N	N	11.6	12.6
1976 Alpha = 100%	4	3	20,905	21,395	9,218	9,708	4,554	5,044	5.0	5.5	2.8	3.0	1.9	2.1	28.2	31.0
Alpha = 77%	4	4	14,880	15,370	5,880	6,370	2,290	2,780	3.8	4.2	2.1	2.3	1.4	1.6	21.7	23.9
Combined Technician																
1974 Alpha = 100%	6	4	725	1,067	N	N	N	N	1.2	1.3	N	N	N	N	a	a
Alpha = 77%	30	14	N	N	N	N	N	N	N	N	N	N	N	N	a	a
1975 Alpha = 100%	39	35	N	N	N	N	N	N	N	N	N	N	N	N	a	a
Alpha = 77%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 100%	3	3	8,960	9,450	3,931	4,421	1,833	2,323	2.7	3.0	1.8	2.0	1.4	1.5	23.9	27.6
Alpha = 77%	4	4	5,682	6,172	1,810	2,300	194	684	2.1	2.3	1.3	1.5	1.0	1.1	15.9	18.5
Operating Room Nursing																
1974 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1975 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1
1976 Alpha = 77 or 100%	-	-	N	N	N	N	N	N	N	N	N	N	N	N	<1	<1

Note. SSS denotes Self-Supporting Students, BR denotes Bursary Recipient, and N denotes a negative value in the case of the present value analysis. In the case of the benefit/cost ratio, N denotes either a negative value or a positive value less than 1. A dash under payback period indicates that the cost of training was never recovered prior to age 65.

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 92

Average Private Monetary Returns to Health Personnel Training for Allowance Recipients Using Alternative Earnings Profiles and Alpha Coefficients

Earnings Profile Program Year Alpha Coefficient	Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
		5%	10%	15%	5%	10%	15%	
Earnings Profile A								
Nursing Assistant								
1974 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	2	N	N	N	N	N	N	<1
1975 Alpha = 100%	–	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1976 Alpha = 100%	1	6,229	5,250	4,328	4.8	4.2	3.7	>50.0
Alpha = 77%	2	4,290	3,644	2,952	3.6	3.2	2.8	>50.0
Dental Assistant								
1974 Alpha = 100%	4	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1975 Alpha = 100%	–	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1976 Alpha = 100%	3	N	N	N	N	N	N	<1
Alpha = 77%	3	N	N	N	N	N	N	<1
Medical Lab. Technology								
1974 Alpha = 100%	3	22,467	11,906	7,262	25.3	13.9	8.9	>50.0
Alpha = 77%	4	16,574	8,465	4,910	19.0	10.2	6.3	41.3
1975 Alpha = 100%	4	15,261	7,711	4,253	10.3	5.7	3.6	32.2
Alpha = 77%	4	10,657	4,877	2,244	7.5	4.0	2.4	24.2
1976 Alpha = 100%	2	33,629	18,888	12,404	21.6	12.6	8.6	>50.0
Alpha = 77%	2	25,519	14,169	9,176	16.6	9.7	6.6	>50.0
Combined Technician								
1974 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	2	N	N	N	N	N	N	<1
1975 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	3	N	N	N	N	N	N	<1
1976 Alpha = 100%	1	10,082	8,281	6,788	7.2	6.1	5.2	a
Alpha = 77%	2	7,269	5,982	4,848	5.5	4.7	4.0	>50.0

Table 92 (continued)

Earnings Profile Program Year Alpha Coefficient	Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
		5%	10%	15%	5%	10%	15%	
Earnings Profile B								
Nursing Assistant								
1974 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	2	N	N	N	N	N	N	<1
1975 Alpha = 100%	–	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1976 Alpha = 100%	1	4,321	3,946	3,351	3.7	3.4	3.1	>50.0
Alpha = 77%	2	2,748	2,619	2,192	2.7	2.6	2.3	>50.0
Dental Assistant								
1974 Alpha = 100%	4	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1975 Alpha = 100%	–	N	N	N	N	N	N	<1
Alpha = 77%	–	N	N	N	N	N	N	<1
1976 Alpha = 100%	3	N	N	N	N	N	N	<1
Alpha = 77%	3	N	N	N	N	N	N	<1
Medical Lab. Technology								
1974 Alpha = 100%	3	20,166	10,648	6,454	22.8	12.5	8.0	>50.0
Alpha = 77%	4	14,833	7,525	4,316	17.0	9.1	5.7	39.4
1975 Alpha = 100%	4	13,134	6,533	3,502	9.0	5.0	3.1	30.2
Alpha = 77%	5	9,064	4,011	1,705	6.5	3.5	2.0	22.4
1976 Alpha = 100%	2	30,282	16,981	11,119	19.6	11.4	7.8	>50.0
Alpha = 77%	2	22,940	12,699	8,185	15.1	8.8	6.0	>50.0
Combined Technician								
1974 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	2	N	N	N	N	N	N	<1
1975 Alpha = 100%	3	N	N	N	N	N	N	<1
Alpha = 77%	3	N	N	N	N	N	N	<1
1976 Alpha = 100%	1	8,029	6,906	5,773	5.9	5.2	4.5	a
Alpha = 77%	2	5,622	4,905	4,060	4.5	4.0	3.5	>50.0

Table 92 (continued)

Earnings Profile Program Year Alpha Coefficient	Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
		5%	10%	15%	5%	10%	15%	
Earnings Profile C								
Nursing Assistant								
1974 Alpha = 100%	2	2,195	1,190	851	3.4	2.3	1.9	[a]
Alpha = 77%	2	1,298	624	406	2.4	1.7	1.4	[a]
1975 Alpha = 100%	2	N	N	N	N	N	N	<1
Alpha = 77%	-	N	N	N	N	N	N	<1
1976 Alpha = 100%	2	10,156	5,547	3,752	7.2	4.4	3.3	>50.0
Alpha = 77%	2	7,445	3,896	2,514	5.6	3.4	2.5	>50.0
Dental Assistant								
1974 Alpha = 100%	3	1,951	949	584	3.1	2.0	1.6	[a]
Alpha = 77%	4	1,121	450	208	2.2	1.5	1.2	[a]
1975 Alpha = 100%	4	N	N	N	N	N	N	[a]
Alpha = 77%	9	N	N	N	N	N	N	[a]
1976 Alpha = 100%	2	6,149	3,245	2,116	4.8	3.0	2.3	[a]
Alpha = 77%	3	4,302	2,099	1,244	3.6	2.3	1.8	[a]
Medical Lab. Technology								
1974 Alpha = 100%	3	16,826	8,364	5,003	19.2	10.1	6.4	>50.0
Alpha = 77%	3	12,489	5,984	3,407	14.5	7.5	4.7	43.0
1975 Alpha = 100%	4	13,737	6,279	3,354	9.4	4.8	3.0	33.8
Alpha = 77%	4	9,832	4,106	1,869	7.0	3.5	2.1	25.5
1976 Alpha = 100%	2	24,565	12,878	8,214	16.1	8.9	6.0	>50.0
Alpha = 77%	2	18,540	9,540	5,949	12.4	6.9	4.7	>50.0
Combined Technician								
1974 Alpha = 100%	2	3,839	2,592	2,045	5.2	3.8	3.2	>50.0
Alpha = 77%	2	2,582	1,718	1,334	3.8	2.9	2.4	>50.0
1975 Alpha = 100%	2	1,408	1,039	874	1.9	1.6	1.5	[a]
Alpha = 77%	3	309	246	212	1.2	1.2	1.1	[a]
1976 Alpha = 100%	2	12,620	7,591	5,492	8.7	5.7	4.4	>50.0
Alpha = 77%	2	9,342	5,470	3,854	6.7	4.4	3.4	>50.0

[a] The rate of return was not meaningful because the net earnings stream fluctuated between positive and negative.

Table 93

Average Private Monetary Returns to Self-Supporting Students in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profiles and Alpha Coefficients

Earnings Profile Program Year Alpha Coefficient		Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
			5%	10%	15%	5%	10%	15%	
Earnings Profile A									
Nursing Assistant									
1974	Alpha = 100%	2	19,830	10,358	6,240	6.9	4.1	2.9	47.0
	Alpha = 77%	3	14,496	7,202	4,032	5.3	3.1	2.2	35.4
1975	Alpha = 100%	3	18,782	9,731	5,744	5.7	3.5	2.5	41.3
	Alpha = 77%	3	13,550	6,581	3,511	4.4	2.7	1.9	30.8
1976	Alpha = 100%	2	41,197	22,294	14,170	10.4	6.1	4.2	>50.0
	Alpha = 77%	2	30,708	16,153	9,897	8.0	4.7	3.3	>50.0
Dental Assistant									
1974	Alpha = 100%	4	18,517	8,920	4,872	6.5	3.7	2.5	34.9
	Alpha = 77%	4	13,485	6,095	2,979	5.0	2.8	1.9	27.4
1975	Alpha = 100%	4	18,364	8,848	4,769	5.6	3.2	2.2	32.7
	Alpha = 77%	4	13,228	5,901	2,760	4.3	2.5	1.7	25.4
1976	Alpha = 100%	3	32,099	16,337	9,686	8.3	4.7	3.2	47.0
	Alpha = 77%	3	23,703	11,566	6,445	6.4	3.6	2.5	36.5
Earnings Profile B									
Nursing Assistant									
1974	Alpha = 100%	3	17,502	8,882	5,174	6.2	3.6	2.5	41.9
	Alpha = 77%	3	12,703	6,066	3,211	4.8	2.8	2.0	31.4
1975	Alpha = 100%	3	16,287	8,115	4,566	5.1	3.1	2.2	36.3
	Alpha = 77%	4	11,628	5,336	2,604	3.9	2.4	1.7	26.8
1976	Alpha = 100%	2	37,258	19,867	12,432	9.5	5.5	3.8	>50.0
	Alpha = 77%	2	27,675	14,284	8,559	7.3	4.2	2.9	48.4
Dental Assistant									
1974	Alpha = 100%	4	16,355	7,644	4,009	5.9	3.3	2.2	31.9
	Alpha = 77%	4	11,820	5,113	2,314	4.5	2.5	1.7	24.9
1975	Alpha = 100%	4	16,000	7,425	3,797	5.0	2.9	2.0	29.5
	Alpha = 77%	4	11,407	4,805	2,011	3.9	2.2	1.5	22.8
1976	Alpha = 100%	3	28,781	14,381	8,349	7.5	4.3	2.9	43.4
	Alpha = 77%	3	21,148	10,060	5,416	5.8	3.3	2.2	33.5
Earnings Profile C									
Nursing Assistant									
1974	Alpha = 100%	2	15,810	7,590	4,510	5.5	3.3	2.3	45.3
	Alpha = 77%	3	10,784	5,071	2,699	4.2	2.5	1.8	32.1
1975	Alpha = 100%	2	15,373	7,694	4,503	4.9	2.9	2.1	41.8
	Alpha = 77%	3	10,925	5,012	2,555	3.8	2.3	1.6	29.1
1976	Alpha = 100%	2	27,859	14,685	9,199	7.3	4.3	3.1	>50.0
	Alpha = 77%	2	20,438	10,294	6,070	5.6	3.3	2.4	44.5
Dental Assistant									
1974	Alpha = 100%	3	15,810	8,113	4,909	5.7	3.4	2.5	45.1
	Alpha = 77%	3	11,400	5,474	3,007	4.4	2.6	1.9	33.1
1975	Alpha = 100%	3	16,890	8,722	5,295	5.3	3.2	2.3	43.9
	Alpha = 77%	3	12,093	5,804	13,165	4.1	2.5	1.8	31.9
1976	Alpha = 100%	2	25,244	13,392	8,441	6.7	4.0	2.9	>50.0
	Alpha = 77%	3	18,425	9,298	5,486	5.2	3.1	2.3	40.7

Table 94

Average Private Monetary Returns to Bursary Recipients in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profiles and Alpha Coefficients

Earnings Profile Program Year Alpha Coefficient	Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
		5%	10%	15%	5%	10%	15%	
Earnings Profile A								
Nursing Assistant								
1974 Alpha = 100%	2	20,172	10,700	6,582	7.7	4.5	3.2	>50.0
Alpha = 77%	3	14,838	7,544	4,374	5.9	3.5	2.5	39.8
1975 Alpha = 100%	2	19,237	10,186	6,199	6.5	3.9	2.8	47.4
Alpha = 77%	3	14,005	7,036	3,966	5.0	3.0	2.1	35.3
1976 Alpha = 100%	2	41,689	22,786	14,662	11.7	6.8	4.8	>50.0
Alpha = 77%	2	31,200	16,645	10,389	9.0	5.3	3.7	>50.0
Dental Assistant								
1974 Alpha = 100%	3	18,859	9,262	5,214	7.2	4.1	2.7	38.5
Alpha = 77%	4	13,827	6,437	3,321	5.6	3.1	2.1	30.3
1975 Alpha = 100%	3	18,819	9,303	5,224	6.4	3.7	2.5	36.7
Alpha = 77%	4	13,683	6,356	3,215	4.9	2.8	1.9	28.6
1976 Alpha = 100%	3	32,591	16,829	10,178	9.3	5.3	3.6	>50.0
Alpha = 77%	3	24,195	12,058	6,937	7.2	4.1	2.8	41.0
Earnings Profile B								
Nursing Assistant								
1974 Alpha = 100%	2	17,844	9,224	5,516	6.9	4.1	2.8	47.2
Alpha = 77%	3	13,045	6,408	3,553	5.3	3.1	2.2	35.3
1975 Alpha = 100%	2	16,742	8,570	5,021	5.8	3.4	2.4	41.8
Alpha = 77%	3	12,083	5,791	3,059	4.4	2.7	1.9	30.8
1976 Alpha = 100%	2	37,750	20,359	12,924	10.6	6.2	4.3	>50.0
Alpha = 77%	2	28,167	14,776	9,051	8.2	4.8	3.3	>50.0
Dental Assistant								
1974 Alpha = 100%	3	16,697	7,986	4,351	6.5	3.6	2.4	35.3
Alpha = 77%	4	12,162	5,455	2,656	5.0	2.8	1.9	27.5
1975 Alpha = 100%	3	16,455	7,880	4,252	5.7	3.2	2.2	33.3
Alpha = 77%	4	11,862	5,260	2,467	4.4	2.5	1.7	25.7
1976 Alpha = 100%	3	29,273	14,873	8,841	8.5	4.8	3.3	48.7
Alpha = 77%	3	21,640	10,552	5,908	6.5	3.7	2.5	37.7
Earnings Profile C								
Nursing Assistant								
1974 Alpha = 100%	2	15,351	7,932	4,852	6.1	3.6	2.6	>50.0
Alpha = 77%	2	11,126	5,413	3,042	4.7	2.8	2.0	37.0
1975 Alpha = 100%	2	15,828	8,149	4,958	5.5	3.3	2.4	49.3
Alpha = 77%	2	11,380	5,467	3,010	4.2	2.6	1.9	34.5
1976 Alpha = 100%	2	28,351	15,177	9,691	8.2	4.9	3.5	>50.0
Alpha = 77%	2	20,930	10,786	6,562	6.4	3.8	2.7	>50.0
Dental Assistant								
1974 Alpha = 100%	2	16,152	8,455	5,251	6.4	3.8	2.7	>50.0
Alpha = 77%	3	11,742	5,816	3,349	4.9	2.9	2.1	37.6
1975 Alpha = 100%	2	17,345	9,177	5,750	5.9	3.6	2.6	>50.0
Alpha = 77%	3	12,548	6,259	3,620	4.6	2.8	2.0	37.1
1976 Alpha = 100%	2	25,736	13,884	8,933	7.6	4.6	3.3	>50.0
Alpha = 77%	2	18,917	9,790	5,978	5.8	3.5	2.5	46.8

Table 95

Average Private Monetary Returns to Allowance Recipients in the Nursing Assistant and Dental Assistant Programs Using a Grade 11 Reference Group with Alternative Earnings Profiles and Alpha Coefficients

Earnings Profile Program Year Alpha Coefficient	Payback Period (Years)	Present Value ($)			Benefit/Cost Ratios			Internal Rate of Return (%)
		5%	10%	15%	5%	10%	15%	
Earnings Profile A								
Nursing Assistant								
1974 Alpha = 100%	1	22,944	13,472	9,354	93.5	55.3	38.7	>50.0
Alpha = 77%	1	17,610	10,316	7,146	72.0	42.6	29.8	>50.0
1975 Alpha = 100%	1	21,951	12,900	8,913	28.5	17.2	12.2	>50.0
Alpha = 77%	1	16,719	9,750	6,679	22.0	13.2	9.4	>50.0
1976 Alpha = 100%	1	44,855	25,952	17,828	61.0	35.7	24.8	>50.0
Alpha = 77%	1	34,366	19,811	13,555	47.0	27.5	19.1	>50.0
Dental Assistant								
1974 Alpha = 100%	1	21,631	12,034	7,986	88.2	49.6	33.2	>50.0
Alpha = 77%	1	16,599	9,209	6,092	67.9	38.1	25.6	>50.0
1975 Alpha = 100%	1	21,533	12,017	7,938	28.0	16.1	11.0	>50.0
Alpha = 77%	2	16,397	9,670	5,929	21.6	12.4	8.4	>50.0
1976 Alpha = 100%	1	35,757	19,996	13,344	48.8	27.7	18.8	>50.0
Alpha = 77%	1	27,361	15,224	10,103	37.6	21.4	14.5	>50.0
Earnings Profile B								
Nursing Assistant								
1974 Alpha = 100%	1	20,616	11,996	8,288	84.1	49.4	34.4	>50.0
Alpha = 77%	1	15,816	9,180	6,325	64.8	38.0	26.5	>50.0
1975 Alpha = 100%	1	19,456	11,284	7,735	25.4	15.2	10.7	>50.0
Alpha = 77%	1	14,797	8,505	5,773	19.6	11.7	8.2	>50.0
1976 Alpha = 100%	1	40,916	23,525	16,090	55.7	32.5	22.5	>50.0
Alpha = 77%	1	31,333	17,942	12,217	42.9	25.0	17.3	>50.0
Dental Assistant								
1974 Alpha = 100%	1	19,469	10,758	7,123	79.5	44.4	29.7	>50.0
Alpha = 77%	1	14,934	8,227	5,428	61.2	34.2	22.9	>50.0
1975 Alpha = 100%	1	19,169	10,594	6,966	25.1	14.3	9.7	>50.0
Alpha = 77%	2	14,576	7,974	5,181	19.3	11.0	7.5	>50.0
1976 Alpha = 100%	1	32,439	18,039	12,007	44.4	25.1	17.1	>50.0
Alpha = 77%	1	24,806	13,718	9,074	34.2	19.3	13.1	>50.0
Earnings Profile C								
Nursing Assistant								
1974 Alpha = 100%	1	18,123	10,704	7,624	74.1	44.2	31.7	>50.0
Alpha = 77%	1	13,898	8,185	5,814	57.0	34.0	24.4	>50.0
1975 Alpha = 100%	1	18,542	10,863	7,672	24.3	14.6	10.6	>50.0
Alpha = 77%	1	14,094	8,181	5,724	18.7	11.3	8.2	>50.0
1976 Alpha = 100%	1	31,517	18,343	12,857	43.1	25.5	18.2	>50.0
Alpha = 77%	1	24,096	13,952	9,728	33.2	19.7	14.0	>50.0
Dental Assistant								
1974 Alpha = 100%	1	18,924	11,227	8,023	77.3	46.3	33.4	>50.0
Alpha = 77%	1	14,514	8,588	6,121	59.5	35.6	25.7	>50.0
1975 Alpha = 100%	1	20,059	11,891	8,464	26.2	15.9	11.6	>50.0
Alpha = 77%	1	15,262	8,973	6,334	20.2	12.3	9.0	>50.0
1976 Alpha = 100%	1	28,902	17,050	12,099	39.6	23.8	17.2	>50.0
Alpha = 77%	1	22,083	12,956	9,144	30.5	18.3	13.2	>50.0